By hand

In the Supreme Court of the United States

OCTOBER TERM, 1975

No. 75-978

E. I. DU PONT DE NEMOURS AND COMPANY, OLIN CORPORATION, FMC CORPORATION, AMERICAN CYANAMID COMPANY, MONSANTO COMPANY, THE DOW CHEMICAL COMPANY, ALLIED CHEMICAL CORPORATION, AND HERCULES INCORPORATED,

Petitioners,

v.

RUSSELL E. TRAIN, as Administrator, Environmental Protection Agency, and JOHN R. QUARLES, as Deputy Administrator, Environmental Protection Agency,

Respondents.

Petition For A Writ Of Certiorari To The United States Court Of Appeals For The Fourth Circuit

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Petitioners E. I. du Pont de Nemours & Co., *et al.*,[1] ask that a writ of certiorari issue to review the judgment of the United States Court of Appeals for the Fourth Circuit entered in this case on December 30, 1975.

Opinions Below

The opinion of the court of appeals is not yet officially reported. The opinion and the judgment of the court of appeals are annexed hereto as Appendix A. The opinion of the United States District Court for the Western District of Virginia is reported at 383 F. Supp. 1244. The opinion

[1] Petitioners are E. I. du Pont de Nemours and Company, Olin Corporation, FMC Corporation, American Cyanamid Company, Monsanto Company, The Dow Chemical Company, Allied Chemical Corporation, and Hercules Incorporated.

and order of the district court are annexed hereto as Appendix B.

Jurisdiction

The judgment of the court of appeals here sought to be reviewed was entered on December 30, 1975. The jurisdiction of this court is invoked under 28 U.S.C. § 1254(1).

Questions Presented

1. Whether district courts or courts of appeals have initial jurisdiction to review regulations issued by the Administrator of the Environmental Protection Agency under the Federal Water Pollution Control Act, as amended, governing wastewater effluent discharges from existing plants.

2. Whether the Federal Water Pollution Control Act, as amended, provides that regulations governing wastewater effluent discharges from existing plants be issued in the form of

(a) "effluent limitations" based upon an authorization said to be implied from Section 301(b) of the Act, or

(b) "guidelines for effluent limitations" in compliance with the express command of Section 304(b) of the Act.

3. Whether when "the Act is not clear" in conferring initial jurisdiction to review regulations for existing plants upon the courts of appeals rather than in providing the normal review in the district courts, the statute should be construed on grounds of practicality to confer such initial jurisdiction on the courts of appeals.

Statutes And Regulations Involved

1. *The Federal Water Pollution Control Act, as amended.* Sections 101, 301, 302, 304, 306, 307, 309, 401, 402, 502, 505 and 509 of the Act (33 U.S.C. §§ 1251, 1311, 1312, 1314, 1316, 1317, 1319, 1341, 1342, 1362, 1365 and 1369) are set forth in Appendix C, *infra*.

2. *"Effluent Limitations Guidelines" for the Inorganic Chemicals Manufacturing Point Source Category.* The regulations issued by the Administrator which govern the wastewater effluent discharges from existing plants in the Inorganic Chemicals Manufacturing Point Source Category are found at 39 *Fed. Reg.* 9611-9639 (March 12, 1974). They are set forth in Appendix D, *infra*.

STATEMENT OF THE CASE

This case presents the question of whether jurisdiction to review certain regulations issued by the Administrator of the Environmental Protection Agency lies as an initial matter in the district courts or in the courts of appeals. This jurisdictional issue is intertwined with substantive issues of the proper construction to be accorded key sections of the statute authorizing the regulations. The Court must necessarily consider the statutory issues in resolving the jurisdictional question. See *Montana-Dakota Utilities Co.* v. *Northwestern Public Service Co.*, 341 U.S. 246 (1951); *Bell* v. *Hood*, 327 U.S. 678 (1946).

The regulations govern wastewater effluent discharges for existing plants as contrasted to new plants,[2] and are issued pursuant to the Federal Water Pollution Control Act, as amended ("the Act"), 33 U.S.C. §§ 1251 *et seq.* The nature of the statutory authority for such regulations is in dispute.

A. The Statutory Framework

In 1972 the Congress enacted the Federal Water Pollution Control Act Amendments of 1972. Pub. L. 92-500, 86 Stat. 816. The Federal Water Pollution Control Act, as basically and extensively revised by the 1972 Amendments,

[2] This proceeding relates only to effluent guidelines applicable to existing plants. Other sections of the statute and of the regulations deal with standards applicable to new sources (new plants) (§ 306, 33 U.S.C. § 1316), or pretreatment of wastes before they may be discharged into a public treatment system (*e.g.*, for a municipality) (§ 307, 33 U.S.C. § 1317).

33 U.S.C. §§ 1251, *et seq.*, constitutes the organic statute under which all effluent discharges from industrial plants and municipalities are regulated.

The structure of the Act is based on a general prohibition of discharges except as they are permitted under the law. (§ 301, 33 U.S.C. § 1311.) Permits for effluent discharges are issued under Section 402 of the Act, 33 U.S.C. § 1342, and the limits and conditions which restrict the discharge of an individual industrial plant are fixed in the permit after proceedings conducted under Section 402.[3] Unless a plant has a permit, no effluent discharges are lawful.[4]

The permit procedure is based on the Congressional policy that the primary responsibility for water quality protection shall rest with the States. (§ 101(b), 33 U.S.C. § 1251(b).) When a State's permit program meets the requirements of the Act, as determined by the Administrator, the statute provides that the permit granting authority shall be transferred to the State from EPA. (See § 402(b)-(f), 33 U.S.C. § 1342(b)-(f).) As of January 1, 1976, twenty-seven (27) States had qualified and now administer the permit program within their respective jurisdictions.[5]

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[3] These are the effluent limitations defined by Section 502(11), 33 U.S.C. § 1362(11):

> "(11) The term 'effluent limitation' means any restriction established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance."

[4] The statute provided, however, that prior to December 31, 1974, if a permit application was pending without dispositive action, effluent discharges from existing plants did not violate the Act. (§ 402(k), 33 U.S.C. § 1342(k).)

[5] These states are:

STATE	DATE OF APPROVAL	FEDERAL REGISTER NOTICE OF APPROVAL
California	May 14, 1973	39 *Fed. Reg.* 26061
Oregon	September 26, 1973	39 *Fed. Reg.* 26061
Connecticut	September 26, 1973	39 *Fed. Reg.* 26061
Michigan	October 17, 1973	39 *Fed. Reg.* 26061
Washington	November 14, 1973	39 *Fed. Reg.* 26061
Wisconsin	February 4, 1974	39 *Fed. Reg.* 26061

For existing plants, the fulcrum for the regulatory framework in which the permit system operates is provided by the regulations setting out the technology based guidelines for effluent limitations under Section 304(b) of the Act, 33 U.S.C. § 1314(b).

The purpose of these guideline regulations is provided by Section 301, 33 U.S.C. § 1311. Subsection (b) of Section 301 has two important attributes. It sets out in technological terms the objective to be "achieved" by existing plants on a stringent time schedule:

> (1) By July 1, 1977, effluent limitations shall be achieved which require application of the "best practicable control technology currently available".
>
> (2) By July 1, 1983, and thereafter, the level to be attained is "best available technology economically achievable" (including elimination of discharges when it becomes "technologically and economically achievable").

STATE	DATE OF APPROVAL	FEDERAL REGISTER NOTICE OF APPROVAL
Ohio	March 11, 1974	39 *Fed. Reg.* 26061
Vermont	March 11, 1974	39 *Fed. Reg.* 26061
Delaware	April 1, 1974	39 *Fed. Reg.* 26061
Mississippi	May 1, 1974	39 *Fed. Reg.* 26061
Montana	June 10, 1974	39 *Fed. Reg.* 26061
Nebraska	June 12, 1974	39 *Fed. Reg.* 26061
Georgia	June 28, 1974	39 *Fed. Reg.* 26061
Kansas	June 28, 1974	39 *Fed. Reg.* 26061
Minnesota	June 30, 1974	39 *Fed. Reg.* 26061
Maryland	September 5, 1974	39 *Fed. Reg.* 34601
Missouri	October 31, 1974	39 *Fed. Reg.* 40067
Hawaii	November 29, 1974	39 *Fed. Reg.* 43759
Indiana	January 2, 1975	40 *Fed. Reg.* 4033
Wyoming	January 31, 1975	40 *Fed. Reg.* 13026
Colorado	March 28, 1975	40 *Fed. Reg.* 16713
Virginia	April 1, 1975	40 *Fed. Reg.* 20129
South Carolina	June 11, 1975	40 *Fed. Reg.* 28130
North Dakota	June 14, 1975	40 *Fed. Reg.* 28663
Nevada	September 20, 1975	40 *Fed. Reg.* 48389
North Carolina	October 20, 1975	40 *Fed. Reg.* 51493
New York	October 29, 1975	40 *Fed. Reg.* 54462

In addition, Section 301 provides that these technological objectives shall be defined and determined [6] in accordance with regulations under Section 304(b). The regulations under Section 304(b), therefore, become the key to the achievement of both the 1977 and the 1983 objectives.[7]

Congress accorded this crucial role to guidelines issued under Section 304(b) to create a regulatory mechanism to cope with the existing plants already in place and operating. Congress recognized the large number of existing industrial plants which are sources of water pollution and the enormous diversity of these plants and their products and processes which would have to be taken into account in the permit program.[8] EPA's statement in the introduction to the regulations speaking of the 1977 guidelines describes the interrelationship between the uniform technological objectives set out in Section 301 and the guideline regulations under Section 304(b) as follows:

[6] The statute uses the term "defined" in Section 301(b)(1)(A) in providing for achievement of the 1977 objectives, and the term "determined" in Section 301(b)(2)(A) in providing for achievement of the 1983 objectives.

[7] This regulatory pattern in the statute is confirmed by the legislative history of the Act. Thus, the Senate Report stated:

> "The program proposed by this Section [§ 301] will be implemented through permits issued in Section 402." (S. Rep. 92-414, 92d Cong., 1st Sess., at 42 (1971), reproduced in Congressional Research Service of the Library of Congress, *A Legislative History of the Water Pollution Control Act Amendments of 1972*, at 1460 (1973) (hereafter "*Leg. Hist.*").)

It then went on to describe the Section 402 permit program as follows:

> "A permit or equivalent program, properly implemented and fully utilizing the resources of the State and Federal Government should provide for the most expeditious water pollution elimination program.
>
> "The information on the technology of control developed under section 304 should facilitate the administration of this system." (*Id.* at 72; *Leg. Hist.* at 1490.)

[8] In contrast, for new plants Congress directed the Administrator to issue "Federal *standards* of performance for new sources" within the industry categories, and not guidelines. (§ 306(b)(1)(B), 33 U.S.C. § 1316(b)(1)(B) (emphasis added).)

> "Section 304(b)(1)(B) of the Act provides for guidelines to implement the uniform national standards of section 301(b)(1)(A). Thus Congress recognized that some flexibility was necessary in order to take into account the complexity of the industrial world with respect to the practicability of pollution control technology." Appendix D, at 17-d.)

In light of the statutory role assigned to guideline regulations under Section 304(b), Congress prescribed that they have two essential elements. *First*, the regulations "shall" identify the degree of effluent reduction attainable by 1977 through the application of "best practicable control technology currently available" for classes and categories of point sources. (§ 304(b)(1)(A).) *Second*, the statute directs that the regulations "shall . . . specify factors to be taken into account in determining control measures and practices to be applicable to point sources . . . within such categories or classes". (§ 304(b)(1)(B).) [9]

Congress explicitly set out in Section 304(b) the factors which EPA was to specify and elaborate with further precision in the regulations.[10] Thus, the statutory provisions mandating the content of the Section 304(b) regulations make it plain that the guidelines are not merely to identify the pollution reduction attainable with the "best prac-

[9] The comparable provisions pertaining to the 1983 guideline regulations are contained in Section 304(b)(2)(A) and (B).

[10] For example, for the 1977 guideline regulations, Congress mandated that the Administrator's regulations "shall" specify and elaborate the following factors:

> "*Factors* relating to the assessment of best practicable control technology currently available to comply with subsection (b)(1) of section 301 of this Act *shall include consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved* from such application, and shall also take into account *the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact* (including energy requirements), and such other factors as the Administrator deems appropriate. . . ." (§ 304(b)(1)(B) (emphasis added).)

The comparable identification of factors to be specified for the 1983 guideline regulations is in Section 304(b)(2)(B).

ticable" (1977) and "best available" (1983) technology. The guidelines are also to provide the permit issuing authorities with EPA's elucidation, and elaboration in the context of the industry-category involved, of the factors to be taken into account in actually determining the application of the guidelines to a particular plant. Thus formulated, the guidelines will perform their intended function in a permit proceeding.

The guideline regulations have a role beyond the initial permit proceedings for a particular plant. Where States and not EPA have the permit-issuing authority, the Act provides that the State shall transmit to the Administrator for his review any permit which it proposes to issue. (§ 402(d)(1), 33 U.S.C. § 1342(d)(1).) The Administrator can block issuance of the permit by the State if within 90 days he "objects in writing to the issuance of such permit as being outside the guidelines and requirements of this Act". (§ 402(d)(2), 33 U.S.C. § 1342(d)(2).)

Section 509 of the Act (33 U.S.C. § 1369) provides for a method of judicial review of certain specific actions of EPA which is different from the normal review procedure in district courts under the Administrative Procedure Act. Section 509 provides that a special review by petition in the courts of appeals shall apply to an expressly specified group of actions by the Administrator, *i.e.*, certain actions under Sections 301, 302, 306 and 307, as well as certain actions taken respecting permits under Section 402. Regulations under Section 304(b) are not mentioned in Section 509.

B. Administrative Proceedings

The 1972 Amendments became law on October 18, 1972. Approximately ten months thereafter, on August 6, 1973, EPA published in the *Federal Register* a notice setting out, among other things, its procedures for adopting guideline regulations under Section 304(b):

> "Advance notice is hereby given concerning notices of proposed rule making to be published by the Environmental Protection Agency ("EPA") with respect to effluent limitations guidelines, standards of performance, and pretreatment standards for new sources pursuant to sections 304(b), 306 and 307(c) of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251, 1314, 1316 and 1317(c); 86 Stat. 816 et seq.; Pub. L. 92-500) ("the Act"). *The purpose of this notice is to facilitate public comment upon the regulations to be promulgated under sections 304(b)*, 306 and 307(c), *both before and after the publication of the notices of proposed rule making*. In addition, this notice will explain EPA's overall plans for development of effluent limitations guidelines and standards of performance for new sources and the approach which is being taken by the Agency in discharging the duties placed upon the Administrator under sections 304(b), 306 and 307(c) of the Act. EPA believes that the exposure of the technical basis and reasoning underlying regulations to be established pursuant to sections 304(b), 306 and 307(c) is essential to the promulgation of sound effluent limitations guidelines and standards of performance for new sources." (38 *Fed. Reg.* 21202 (August 6, 1973) (emphasis added).) [11]

Also in the August 1973 notice, EPA announced that it had initiated technical studies by independent contractors "of some thirty [separate] point source [industrial] categories for which regulations will initially be promulgated. . . ." (38 *Fed. Reg.* at 21203.) Among the industrial categories was "[No.] 15. Inorganic Chemicals Manufacturing". (*Id.*) EPA said it would make the contractor's technical reports available for review by interested persons, prior to the time it actually proposed any regulations for an industry. (*Id.* at 21205-21206.)

EPA's contractor for the inorganic chemicals industry regulations was General Technologies Corp. ("General Technologies"). In June 1973, EPA made available General Technologies' "Draft Contractor's Report". That report

[11] As noted *supra*, at 3 n.2, Section 306 provides for standards of performance for new sources. Section 307 provides for pretreatment standards for existing sources (subsection 307(b)), and for new sources (subsection 307(c)).

set out technical wastewater and treatment information for 22 separate products in the industry. In a preambular statement to the report, the Agency stated—"The regulations to be published by EPA under Sections 304(b) and 306 of the Federal Water Pollution Control Act, as amended, will be based to a large extent on the report and the comments received on it."

Next, in August 1973, EPA made available an "Economic Analysis Of Proposed Effluent Guidelines—Inorganic Chemicals, Alkali And Chlorine Industries (Major Products)". This report also was prepared for EPA by an independent contractor, under the Agency's supervision. EPA's preface to the report said that the purpose of the economic study was

> "to analyze the economic impact which could result from the application of alternative effluent limitation guidelines and standards of performance to be established under sections 304(b) and 306 of the Federal Water Pollution Control Act, as amended."

The Agency received comments from interested parties, including the petitioning companies. And by August 1973, EPA had reviewed and revised the General Technologies technical report and issued its "Development Document for *Proposed Effluent Limitations Guidelines* and New Source Performance Standards for the Major Inorganic Products Segment of the Inorganic Chemicals Manufacturing Point Source Category". (Emphasis added.) Then, on October 11, 1973, EPA published a notice of proposed rulemaking for "effluent limitations guidelines and standards of performance" applicable to the previously-studied 22 separate product subcategories in the inorganic chemicals industry. (38 *Fed. Reg.* 28173-28194.) The Agency relied upon the reports of General Technologies and of its economic contractor, the comments made on those reports by interested parties, and its own assessment of technical treatment information. (38 *Fed. Reg.* at 28175.) For existing plants EPA said that "[t]he regulations proposed herein set forth effluent limitations guidelines, pursuant to

section 304(b) of the Act, for . . . [the 22 individual product subcategories], of the inorganic chemicals manufacturing category". (38 *Fed. Reg.* at 28174.)

Comments were submitted on the Agency's proposed guideline regulations for existing plants and new source standards of performance for new plants. During the time the Agency was evaluating comments on the proposed guidelines for the inorganic chemicals industry, EPA issued general definitional regulations applicable to all the industry-category regulations. (40 C.F.R. Part 401, *added by* 39 *Fed. Reg.* 4531-4533 (February 4, 1974).) Those general regulations contained a definition of "effluent limitations guidelines":

> "(j) The term 'effluent limitations guidelines' means any effluent limitations guidelines issued by the Administrator pursuant to section 304(b) of the Act." (40 C.F.R. § 401.11(j).)

But before the Agency had finished its evaluation of the comments and issued its final regulations, an Agency document was written and publicized which gave notice that EPA was changing the asserted legal basis of the regulations for existing plants. On February 25, 1974, Alan G. Kirk II, the Assistant Administrator for Enforcement and General Counsel, wrote in a widely-publicized memorandum that "the effluent limitations guidelines which the Agency is presently issuing under Section 304(b) are also being issued [under] Section 301 and establish effluent limitations under Section 301". (Memorandum from Alan G. Kirk II to Acting Assistant Administrator for Air and Water Programs, at 2, February 25, 1974.) Assistant Administrator Kirk's Memorandum also contained a warning, *i.e.*, the Agency's new reliance on Section 301 as an authority for its regulations applicable to existing plants had consequences for the jurisdiction and timing of any judicial action brought to obtain review:

> "these guidelines fall within the provision in Section 509(b) for judicial review within 90 days of 'any effluent or other limitation under Section 301.' The

> effluent limitations guidelines promulgated by the Agency will implement both Section 301 and Section 304. Since it would be impossible to challenge the Section 301 limitations without challenging the Section 304(b) guidelines, the requirements in Section 509(b) that limitations promulgated pursuant to Section 301 be challenged in the United States Court of Appeals and within 90 days almost must be considered to include challenges to Section 304 guidelines." (*Id.* at 2.)

Very shortly thereafter, on March 12, 1974, the Agency issued its final regulations for the 22 product subcategories of the inorganic chemicals industry. (39 *Fed. Reg.* 9611-9635; Appendix D.) Notably, EPA still called its regulations for existing plants "[e]ffluent limitations guidelines". (See, *e.g.*, 40 C.F.R. § 415.192, *added by* 40 *Fed. Reg.* 9632 (March 12, 1975); *infra*, at 31–d.) And although EPA mentioned Section 301 along with Section 304 in the preamble of the rulemaking order,[12] concurrently it asserted that "[t]he legal basis" for the regulations was that set forth in the August 1973 general notice of procedures (see *supra*, at 8-9), which of course referred only to guideline regulations under Section 304. (39 *Fed. Reg.* at 9612; *infra*, at 2–d.)

C. Judicial Proceedings And Decisions Below

On April 1, 1973, the petitioning companies filed a complaint in the U.S. District Court for the Western District of Virginia seeking review of EPA's guideline regulations applicable to existing plants in the sulfuric acid production subcategory of the inorganic chemicals industry. (40 C.F.R. §§ 415.210-.213, *infra*, at 35–d to 36–d.) The companies asserted that the district court had jurisdiction of the review action based upon the provisions of 28 U.S.C. §§ 1331, 1332, 1337, 1361 and 1651, the Declaratory Judgment Act, 28 U.S.C. §§ 2201-2202, and Section 10 of the

[12] The Agency said: "This final rulemaking is promulgated pursuant to sections 301, 304(b) and (c), 306(b) and (c) and 307(c) of the Federal Water Pollution Control Act, as amended. . . ." (39 *Fed. Reg.* at 9612; *infra*, at 2–d.)

§§ 701-706. Contemporaneously fifteen companies including the eight petitioning companies filed "protective" petitions for review of the EPA inorganic-chemical guideline regulations in the U.S. Court of Appeals for the Fourth Circuit. *E.g., E. I. du Pont de Nemours & Co.* v. *Train,* No. 74-1261 (4th Cir.). The actions in the district court and in the courts of appeals proceeded independently for a time.

In the district court the companies promptly filed a motion seeking partial summary judgment on the issues of that court's jurisdiction and of EPA's power and obligations under the Act to issue regulations for existing plants. EPA filed a motion to dismiss the district court action based upon an asserted lack of subject matter jurisdiction. The companies argued that EPA was mandated by the Act to issue guideline regulations for existing plants under Section 304(b), that the Agency had not been granted power to issue effluent limitations by regulations under Section 301, that a contrary construction would emasculate the Congressionally-structured power of State permit-issuing authorities, and that jurisdiction to review guideline regulations properly lay with the district court. EPA contended that it had an implied power under Section 301 to issue effluent limitations by regulations, that Section 304(b) merely provided a "definitional" basis for establishing the effluent limitations, that the limitations were to be "mechanically cranked" into permits for particular plants, and that Section 509(b) of the Act provided for exclusive jurisdiction of any review action in the courts of appeals.

After a hearing on the cross-motions, the district court on September 27, 1974, issued an opinion and order adopting EPA's contentions and dismissing the complaint. See *infra*, Appendix B. An expedited appeal was taken.

In the court of appeals during this same period, the Fourth Circuit had consolidated the protective review actions, and the Agency had filed the administrative record

of the rulemaking proceedings with the court.[13] A brief was filed by the companies on legal issues, *i.e.*, contesting EPA's statutory construction and the jurisdiction over the protective petitions by the court of appeals. In addition, the companies also filed briefs challenging eleven of the 22 product subcategory guidelines, on the ground that the regulations were not supported by the administrative record. Similarly, EPA's brief covered both the legal and the technical issues. Six *amici curiae* were given leave to file briefs on various legal and technical issues.

After briefing but before the guideline cases were argued, the appeal from the district court's decision was perfected. On motion of the parties, the appeal was consolidated by the court of appeals with the guideline review actions. The court of appeals ordered a truncated and accelerated supplemental briefing schedule for the appeal.

Argument to the court of appeals of the consolidated petitions and appeal was had on April 22, 1975. Thereafter, on December 30, 1975, the court of appeals issued a decision in the appeal only. It affirmed the district court's judgment and upheld its own jurisdiction over the protective review petitions, but its reasoning for doing so was quite different from that of the district court. The court of appeals opined that it had jurisdiction under the Act to review action by the Administrator in promulgating guidelines under Section 304, even if the Administrator had no power to issue limitations by regulations under Section 301:

> *"Even if § 301 merely sets out the technological objectives to be attained under the Act, courts of appeals may properly assume jurisdiction to review actions of the Administrator in issuing regulations to achieve these objectives.* If § 301 is to be viewed in the manner advocated by the appellants, then § 304(b) must necessarily be deemed the key to the attainment of the objectives set forth in § 301. Thus, to obey the mandate of § 301, 'guidelines for effluent limitations' must be promulgated under § 304(b). Construed in this light, *any action taken by the Administrator under § 304(b) should properly be considered to be pursuant to the provisions of § 301 and, therefore, reviewable by this court under § 509.*" (Appendix A, at 11-a (emphasis added).)

The court of appeals to date has not issued its decision in the protective review actions.

[13] Separate petitions for review were also filed respecting EPA's new source standards for the industry, issued under Section 306(b) of the Act. These actions were consolidated by the court of appeals into a separate group, and the briefing on this separate group proceeded independently of the consolidated guideline actions.

REASONS FOR GRANTING THE WRIT

I. There Is A Four-Way Conflict Among The Courts Of Appeals On The Statutory Authority Of The Administrator To Issue The Central Regulations Under The Act And On The Jurisdiction Of Federal Courts To Review Those Regulations.

This is a case of first impression raising substantial issues of nationwide importance regarding the construction of the Federal Water Pollution Control Act. The questions in this case are crucial to implementation of that Act because they relate to the nature of, and the statutory authority of the Administrator to issue, the central regulations under the Act applicable to all industrial discharges by existing plants into navigable waters in the United States. To date, five courts of appeals have considered and decided the questions here presented. In deciding the five cases, the courts of appeals have adopted four separate and conflicting positions respecting the intertwined questions of jurisdiction and statutory construction. This four-way conflict involves important issues which have not been and which should be decided by this Court.

The Federal Water Pollution Control Act mandates that the Administrator publish on a specified, prompt time schedule regulations governing effluent discharges from existing plants. It holds out a promise to those affected by

the regulations that judicial review may be had of the Administrator's action in establishing the regulations. And, it requires achievement on a stringent time schedule of the technological objectives implemented by the regulations. The Act's timetable for actions has been short-circuited by the unresolved conflict of views over questions of basic statutory construction and over the courts' jurisdiction to review disputed actions by the Administrator.

To a considerable extent, the positions of the various courts of appeals reflect the manner in which the questions of basic statutory construction and jurisdiction were presented.

The first decision by a court of appeals on these questions was by the Eighth Circuit in *CPC International Inc.* v. *Train*, 515 F.2d 1032 (8th Cir. 1975). The Eighth Circuit had before it protective petitions filed by corn wet milling companies seeking review of EPA's guideline regulations and new source standards for the "Corn Wet Milling Subcategory" of the "Grain Mills Point Source Category". (515 F.2d at 1034.) The petitioners in the *CPC* case had raised and briefed to the Eighth Circuit the issues of jurisdiction and basic statutory construction. The Eighth Circuit's decision held that the statute did not empower the Administrator to promulgate by regulations effluent limitations for existing plants.[14] Rather, under the mandatory language of Section 304(b), the Administrator was required to issue guideline regulations for existing plants. (515 F.2d at 1037.) The Eighth Circuit also concluded that the guideline regulations were to be reviewed initially in the district courts, observing that Section 509(b) of the Act did not specify promulgation of the Section 304(b) guideline regulations as being among the expressly listed group of actions which were to be reviewed in the courts of

[14] The Administrator had argued that he had implied authority to issue limitation regulations, and that such regulations were "to be mechanically cranked into individual permits issued by the states or the EPA". (515 F.2d at 1037.)

appeals. (*Id.*)[15] The Eighth Circuit reached its conclusions only after an exhaustive survey of ancillary statutory provisions and of the legislative history of the Act.[16]

Then, in *American Iron and Steel Institute* v. *Environmental Protection Agency*, ——F.2d——, No. 74-1640 (3d Cir., decided November 7, 1975), the Third Circuit considered the issue of statutory construction. Like the corn wet milling companies in the *CPC* case, the petitioning steel companies had contended that the Administrator had no power to issue limitations by regulations, but rather, a Section 301 limitation was to be established through a permit proceeding using the Section 304(b) guideline regulations. (Slip opinion, at 13.) The petitioning companies, however, did not raise the jurisdictional issue. After discussing the Eighth Circuit's *CPC* decision and the positions of the parties, the Third Circuit concluded that the Administrator could issue limitation regulations under Section 301 which would provide a treatment " 'base level', and concomitant pollutant ceiling". (Slip opinion, at 33.) However, the Third Circuit at the same time sought to give effect to Section 304's mandate that guideline regulations be issued. The court held that for the use of permit-issuing authorities the Administrator had to issue guideline regulations providing a range of more stringent controls underneath the Section 301 ceiling:

> "Having determined the 'base level', and the 'ceiling', he [the Administrator] must then promulgate guide-

[15] The court took especial "note that counsel for the government stated at oral argument that, if it were held that the existing source regulations had been promulgated pursuant to § 304(b), they would be reviewable in District Court". (515 F.2d at 1038 n.12.)

[16] The Eighth Circuit took jurisdiction to review the new source standards for the corn wet milling industry; the parties had agreed that jurisdiction to review those standards was in the courts of appeals under Section 509(b)(1)(A) ("standards of performance for new sources") and (C) ("pretreatment standard for new sources"). On the merits, the Eighth Circuit determined that both the standards of performance for new sources and the pretreatment standards for new sources were not supported by the administrative record, and the court remanded the standards to the Agency. (515 F.2d at 1043-1052.)

lines which are to guide the permit-issuing authorities in deciding whether, and by how much, the limitation to be applied to any individual point source is *more* stringent than the base level (in terms of requiring more effective technology), and more stringent than the ceiling (in requiring a lower amount of effluent discharge). *Thus, we reconcile sections 301 and 304 in the following manner: the section 301 limitations represent both the base level or minimum degree of effluent control permissible and the ceiling (or maximum amount of effluent discharge) permissible nationwide within a given category, and the section 304 guidelines are intended to provide precise guidance to the permit-issuing authorities in establishing a permissible level of discharge that is more stringent than the ceiling.*" (Slip opinion, at 33-34 (emphasis by the court and emphasis added).)

The Third Circuit remanded the regulations for the iron and steel industry to EPA in accordance with its opinion. Judge Adams, in a concurring opinion, expressed distress and dismay at "[t]he failure [of Congress] to provide a clear procedural structure on so basic a matter in the administration of the Act. . . ." (Concurring slip opinion, at 4.)

Yet a third position on these issues of statutory construction and jurisdiction was adopted by the Seventh Circuit in *American Meat Institute v. Environmental Protection Agency*, ——F.2d——, No. 74-1394 (7th Cir., decided November 24, 1975). The petitioner sought review of EPA's regulations for existing slaughterhouses and meatpacking plants. Petitioner raised only technical issues dependent upon the administrative record. Petitioner did not contend that EPA had failed to comply with Section 304(b). (Slip opinion, at 9 n.13.) The court allowed *amici curiae* to raise the jurisdictional issue but no other questions. (Slip opinion, at 8-9 & n.12.) The Seventh Circuit held that the Administrator had authority to issue limitations by regulation under Section 301, and that as a consequence, it had jurisdiction to review EPA's regulations for the meat industry.[17] The Seventh Circuit's decision is thus in accord with the district court's decision in the *du Pont* case.

The Tenth Circuit in *American Petroleum Institute* v. *Train*, ——F.2d——, No. 75-1404 (10th Cir., decided December 15, 1975), addressed the jurisdictional issue as a matter of bare statutory interpretation without the benefit of an administrative record. The court of appeals affirmed a district court's dismissal of a complaint filed to obtain review of EPA's regulations for existing petroleum refineries. The court had accelerated the appeal to decide the jurisdictional question before having briefing and argument of protective petitions for review which had been filed. The court held that it and not the district court had jurisdiction "because the Administrator has not only claimed the power but also has acted to promulgate regulations under § 301", whether or not the Administrator actually had statutory authority to do so. (Slip opinion, at 6.)

In sum, taken with the Fourth Circuit's decision in the present case, the courts of appeals have reached the following four separate positions on the issues presented here:

(1) EPA has no power to issue limitations by regulation under Section 301. Rather limitations are to be established by permit-issuing authorities in Section 402 permit proceedings using guideline regulations issued under Section 304(b). District courts have jurisdiction to review the guideline regulations. *CPC International Inc.* v. *Train*, 515 F.2d 1032 (8th Cir. 1975).

Petitioners take this position.

(2) EPA has power to issue limitations by regulation under Section 301. The limitations are to be ceilings, and guideline regulations are to provide a range of values below the ceiling for the use of permit-issuing authorities in resolving a discharge permit for individual plants. Impliedly, courts of appeals have

[17] The Seventh Circuit did not address in any respect the Administrator's obligations under Section 304. (See slip opinion, at 9 n.13.)

jurisdiction to review the limitation-guideline regulations. *American Iron and Steel Institute* v. *Environmental Protection Agency*, ——F.2d——, No. 74-1640 (3d Cir., decided November 7, 1975).

None of the parties in any of the cases decided by a court of appeals has taken this position.

(3) EPA has power to issue limitations by regulation under Section 301. No place in the statutory scheme is assigned to guideline regulations under Section 304. The courts of appeals have jurisdiction to review limitations regulations. *American Meat Institute* v. *Environmental Protection Agency*, ——F.2d ——, No. 74-1394 (7th Cir., decided November 24, 1975), along with the district court's decision in the present case.[18]

From February 25, 1974 to the present, EPA has taken this position.

(4) Even if the Administrator has no power to issue limitations by regulation under Section 301, the guideline regulations mandated by Section 304(b) are referred to in, and are "the key to the attainment of the objectives set forth in § 301". Thus, the guideline regulations issued by the Administrator under Section 304(b) "should properly be considered to be pursuant to provisions of § 301 . . . ." Review of the guideline regulations consequently is in the courts of appeals. *E. I. du Pont de Nemours & Co.* v. *Train*, ——F.2d ——, No. 74-2237 (4th Cir., decided December 30, 1975) (Appendix A, at 11–a).[19]

Parties in a number of the cases have advocated this result, albeit on somewhat different reasoning.

[18] A similar position was also adopted by Judge Pratt in *American Paper Institute* v. *Train*, 381 F. Supp. 553 (D.D.C. 1974), *appeal pending*, No. 74-1967 (D.C. Cir.).

[19] The Tenth Circuit's decision in the *American Petroleum Institute* case arguably reaches this result, albeit by a different route. However, the Tenth Circuit's decision would allow action by the Administrator, even if wholly unauthorized, to establish the jurisdiction of a court by the citation of statutory provisions in the preamble to regulations. As the Fourth Circuit noted in its opinion, a court's jurisdiction reflects a power conferred by Congress and is determined by the Court, not by the Administrator through the device of statutory citation. (*E. I. du Pont de Nemours & Co.* v. *Train*, *supra*, Appendix A, at 12–a.)

As Judge Adams observed, "[t]he conflict of interpretation between [among] the Circuits does not initiate, but certainly perpetuates confusion in the administration of the legislation." *American Iron and Steel Institute* v. *Environmental Protection Agency*, *supra*, concurring slip opinion, at 4. This Court should grant certiorari and resolve the conflict on these very important issues. Judge Adams correctly expressed the reasons why this Court's action is essential:

"Regardless of the merits of the respective positions of the Eighth Circuit and this Court, both have had to arrive at their divergent interpretations of this fundamental aspect of the Act by inferences from ancillary provisions, and by deciphering the legislative intent from reading scraps and bits of a convoluted legislative history.

"The failure to provide a clear procedural structure on so basic a matter in the administration of the Act is disquieting. In one sense, the difficulty of interpretation imposed here is of little consequence; it is the work of the courts to explicate the laws, no matter how complex their structure. In this instance, however, statutory vagueness inflicts harm on the purposes of the Act and impels the courts to determine the allocation of authority between the national and state governments in the administration of this program. *The conflict of interpretation between the Circuits does not initiate, but certainly perpetuates confusion in the administration of the legislation. Under these circumstances, neither the states nor the Administrator, nor the industries and municipalities which are to be regulated by the Act, can be confident which agency possesses the legal authority to promulgate effluent limitations. The result of such incertitude is delay in the implementation of the substantive provisions of the Act while the concerned parties engage in costly litigation to determine the legal powers of each enforcement agency.* Such controversy postpones the achievement of the Act's lofty objectives, and imposes a burden on the Courts of Appeals and the Supreme Court which they might have been spared by careful drafting." (*American Iron and Steel Institute* v. *Environmental Protection Agency*, *supra*, concurring slip opinion, at 4-5.)

II. This Case Appropriately Presents These Very Important Questions.

The courts of appeals have found the questions presented here to be quite difficult. In several instances the issues were made even more troublesome by the failure of the parties to address them directly. This case does not present any such problems.

Throughout the proceedings in both the district court and the court of appeals, the parties focused upon the issues of jurisdiction and statutory construction. The courts suffered no procedural impediment to reaching the issues and to deciding them.

The case also carries with it the full administrative record of the Administrator's action in issuing the guideline regulations for this industry. In the Fourth Circuit, the case was consolidated for decision with the contemporaneously-filed petitions for review. Thus when it issued its decision, the court of appeals had before it the administrative record and the briefs of the parties on the technical issues relating to the record in addition to the briefs on the legal issues here presented.

In sum, the case fully and fairly presents the questions stated, on a complete record, and after extensive consideration both by the court of appeals and by the district court.

III. This Case Presents Questions Respecting The Proper Roles Of Congress And The Judiciary In Resolving The Proper Forum For Initial Review Of Informal Rulemaking Action.

The opinion of the court of appeals relies heavily for its results upon "[t]he practical difficulties" of a determination that review of guideline regulations was initially in the district courts. (Appendix A, at 10–a, n.5.) The court noted that review of the EPA's issuance of standards for new plants was unquestionably in the courts of appeals under Section 509(b)(1)(A). District court review of

guideline regulations would thus result in bifurcated review between the two courts. (*Id.* at 10–a.) Since Congress had not affirmately expressed a desire for such a result, the court of appeals concluded that Congress had not intended it. (*Id.*)

The court of appeals, however, failed to consider the countervailing practical difficulties arising from its decision. For example, Section 509(b)(2) forbids in enforcement actions the raising of a defense that regulations are invalid if review could have been had under Section 509(b)(1):

> "(2) Action of the Administrator with respect to which review could have been obtained under paragraph (1) of this subsection shall not be subject to judicial review in any civil or criminal proceeding for enforcement."

Moreover, Section 509(b)(1) ordinarily allows review only if a petition is filed within 90 days after the Administrator's action:

> "Any such application [for review in the court of appeals] shall be made within ninety days from the date of such determination, approval, promulgation, issuance or denial, or after such date only if such application is based solely on grounds which arose after such ninetieth day."

These are harsh measures under any circumstances. They are especially harsh for litigants who, upon reading the special review provisions which did not mention regulations under Section 304(b), could not fairly conclude that the special review provisions applied to guideline regulations issued under Section 304.

Various pragmatic reasons for assigning review of informal rulemaking action to one court or another have been much mooted recently by both judges and commentators.[20]

[20] *E.g.*, Judge Clark of the Fifth Circuit, writing in concurrence to that court's decision in *Texas* v. *Environmental Protection Agency*, 499 F.2d 289 (5th Cir., 1974), called for district court review of regulations,

The discussion of such policy factors has, however, largely been confined to a consideration of reasons for Congress to write legislation in one fashion or another. In contrast, here the courts are considering such policy factors in reaching decisions which would operate retroactively to deprive unsuspecting persons or groups of any review, given the aforementioned restrictions present in paragraphs 509(b)(1) and (2).

The policy questions concerning the appropriate forum for review must therefore have a restricted role in this case, notwithstanding their importance in a legislative context. Congress decides the forum for review, not the courts. The court of appeals, however, because it was impressed with certain practical considerations, construed the Act as conferring initial jurisdiction on the courts of appeals. The court could not point to any provision in the Act establishing such a special review. And in the absence of such a special provision, the normal rule provides for initial review in the district courts. But since the court felt the normal rule was impractical, the court viewed the silence of Congress as to special review [21] as being equivalent to the position that the Act is ambiguous, *i.e.*, that the "Act is not clear". (Appendix A, at 10–a, n.5.) Under these circumstances, the decision below raises the question whether "practical" reasons justify a construction which reads special provisions for review into the statute when Congress has made no such provision expressly.

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emphasizing the ability of a trial judge to take evidence and to sift facts. In contrast, a recent article by Professors Currie and Goodman advocated that review of "important" regulations be had initially in the courts of appeals, because such regulations ordinarily would have broad and significant scope and because a correct decision was more likely in the courts of appeals by virtue of the collegial decision-making process. (See Currie and Goodman, *Judicial Review Of Federal Administrative Action: Quest For The Optimum Forum*, 75 Colum. L. Rev. 1, 53-54 (1975).

[21] As Judge Widener said in the court of appeals, Congress could have solved the issues in this case by "[a] simple declaratory sentence, or even a phrase, or a word . . . ." (Appendix A, at 10–a, n.5.)

CONCLUSION

The questions presented raise issues of national and lasting importance upon which a four-way conflict in decisions among the courts of appeals has arisen. The issues are fully and fairly presented for decision by this Court in the present case. The petition should be granted.

Respectfully submitted,

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JANUARY 9, 1976

APPENDIX A

United States Court of Appeals
FOR THE FOURTH CIRCUIT

No. 74-2237

E. I. du Pont de Nemours and Company, Olin Corporation, FMC Corporation, American Cyanamid Company, Monsanto Company, The Dow Chemical Company, Allied Chemical Corporation and Hercules, Inc.
Appellants

v.

Russell E. Train, as Administrator, Environmental Protection Agency, and John R. Quarles, as Deputy Administrator, Environmental Protection Agency
Appellees

On appeal from the United States District Court for the Western District of Virginia, at Roanoke, James C. Turk, Chief District Judge.

Argued April 22, 1975 Decided Dec. 30, 1975

Before Rives* and Breitenstein**, Senior Circuit Judges, and Widener, Circuit Judge.

Robert C. Barnard (Douglas E. Kliever and Charles F. Lettow, Cleary, Gottlieb, Steen and Hamilton, John L. Walker Jr., on brief) for Appellants; Kathryn A. Oberly, Attorney U.S. Department of Justice, Paul R. Thomson, Jr., Assistant United States Attorney, (Wallace H. Johnson, Assistant Attorney General, Alan G. Kirk, II, Assistant Administrator for Enforcement and General Counsel, Edmund B. Clark, Bruce J. Chasan, Attorneys, U.S. Department of Justice, Ray E. McDevitt, Attorney, Environmental Protection Agency, on brief) for Appellees.

*** Senior Circuit Judge, U.S. Court of Appeals for the Fifth Circuit.**
**** Senior Circuit Judge, U.S. Court of Appeals for the Tenth Circuit.**

WIDENER, Circuit Judge:

This is an appeal from a judgment of the United States District Court for the Western District of Virginia dismissing appellants' action for lack of subject matter jurisdiction. Suit was filed in the district court by the appellants, eight chemical manufacturers, who sought review of certain regulations promulgated under the Federal Water Pollution Prevention and Control Act of 1972. 33 USC § 1251 et seq (hereinafter the Act). These regulations, which purport to establish effluent limitations for inorganic chemicals, were issued by the Administrator of the Environmental Protection Agency (EPA), appellee herein, on March 12, 1974, and consist of:

(1) Standards of performance for new plants.

(2) Pretreatment standards for new plants discharging wastes into municipal treatment plants.

(3) Effluent limitations for existing plants. 39 Fed. Reg. 9612 et seq, 40 CFR 415.

The only question presented in this appeal is whether the district courts have jurisdiction to review effluent limitations regulations issued by the Administrator to control effluent discharges from existing plants. A necessary corollary is whether the courts of appeals have jurisdiction under § 509 of the Act, 33 USC § 1369(b)(1), to review, on direct petition for review, regulations for existing plants, for if we have the jurisdiction, the district courts do not.[1] We conclude for the reasons stated below that the

[1] Section 509 provides in relevant part:

"(b)(1) Review of the Administrator's action . . . (E) in approving or promulgating any effluent limitation or other limitation under section 301, 302, or 306, and (F) in issuing or denying any permit under section 402 may be had by any interested person in the Circuit Court of Appeals of the United States for the Federal judicial district in which such person resides or transacts such business upon application by such person."

No question is made here of any concurrent jurisdiction of the district courts and the courts of appeals, and we see nothing in the statute to indicate that Congress intended such concurrent jurisdiction. As noted in *Passenger Corp. v. Passenger Association*, 414 US 453, 458 (1974), "[a] frequently stated principle of statutory con-

courts of appeals do have jurisdiction to review directly the regulations in question, and, therefore, the judgment of the district court must be affirmed.

As the district court noted, the issue presented was largely one of first impression. Although the matter has now been considered directly or indirectly by some few courts, it is yet relatively new and we think it appropriate that we ascertain the intent of Congress in adopting the Act in its present form by looking to the language of the statute itself and its legislative history, as well as the decisions on the subject. The original Act dates from 1948, but did not assume its present form until 1972 when the then existing statutory language was extensively revised. The object of these revisions, as noted in the body of the statute itself, was and is the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters. 33 USC § 1261. This goal is to be accomplished primarily through the control of pollutants discharged into navigable waters. It should be kept in mind that the 1972 amendments changed the emphasis in the statutory scheme of water pollution control from that of regulating the quality standard of the body of water involved to regulating not only the quality standard of the body of water but also the quality of effluent discharged into the body of water. Compare the various statutes itemized in footnotes to 33 USCA § 1251, et seq; and see, e.g., Senate Report 92-214, dated October 28, 1971; House Report 92-911 dated March 11, 1972; *CPC International v. Train*, 515 F.2d 1032, 1034-36 (8th Cir. 1975).

In the course of adopting the 1972 amendments, a great deal of attention was focused on the proper function of the States in the regulation and control of overall water quality. This is reflected in Congress' concern, written

struction is that when legislation expressly provides a particular remedy or remedies, courts should not expand the coverage of the statute to subsume other remedies." Cf. § 505(a) of the Act, 33 USC § 1365(a), which specifically confers jurisdiction on the district courts for certain actions under the statute. *NRDC v. Train*, 7 ERC 1123 (D.C. Cir. 1974).

into the statute, that the "primary responsibilities and rights of the States to prevent, reduce and eliminate pollution be preserved." 33 USC § 1251(b). Although the United States in the last analysis regulates, in most cases, the amount of pollution discharged into the nation's waters, the States, through the permit granting plan (§ 402, 33 USC § 1342), are intended to take a large part in the administration and application of the statutory plan, including the application of regulations issued by the EPA as well as the application of the statute.[2] There is here no need to, and we do not, express an opinion as to the extent, construction, effect, or application of any regulation issued by EPA.

Central to the statutory framework within which the permit system is to operate are the regulations providing for or establishing effluent limitations. The EPA contends that the Act contemplates that the Administrator promulgate actual effluent limitations which will be uniformly applied in issuing permits under the Act.[3] According to its

[2] For a good general discussion of the statute through the eyes of EPA's Assistant General Counsel, see Zener, *The Federal Law of Water Pollution Control*, Federal Environmental Law, 683 (West 1974).

[3] Section 402, 33 USC § 1342, establishes the procedure for the issuance of permits under the Act. It states:

"(a)(1) Except as provided in sections 318 and 404 of this Act, the Administrator may, after opportunity for public hearing, issue a permit for the discharge of any pollutant, or combination of pollutants, notwithstanding section 301(a), upon condition that such discharge will meet either all applicable requirements under section 301, 302, 306, 307, and 403 of the Act, or prior to the taking of necessary implementing actions relating to all such requirements, such conditions as the Administrator determines necessary to carry out the provisions of this Act.

"(2) The Administrator shall prescribe conditions for such permits to assure compliance with the requirements of paragraph (1) of this subsection, including conditions on data and information collection, reporting, and such other requirements as he deems appropriate.

. . . .

"(b) At any time after the promulgation of the guidelines required by subsection (h)(2) of section 304 of this Act, the Governor of each State desiring to administer its own permit program for discharges into navigable waters within its jurisdiction may submit to the Administrator a full and complete description of the program it proposes to establish and administer under State law or under an interstate compact. In addition, such State shall submit a statement from the attorney general (or the attorney for those State water pollution control agencies which have independent legal counsel), that the laws of such State, or the interstate compact, as the case may be, provide adequate authority to carry out the described program. The Administrator shall approve each such program unless he determines that adequate authority does not exist. . . .

. . . .

"(d)(1) Each State shall transmit to the Administrator a copy of each permit application received by such State and provide notice to the Administrator of every action related to the consideration of such permit application, including each permit proposed to be issued by such State.

"(2) No permit shall issue (A) if the Administrator within ninety days of the date of his notification under subsection (b)(5) of this section objects in writing to the issuance of such permit, or (B) if the Administrator within ninety days of the date of transmittal of the proposed permit by the State objects in writing to the issuance of such permit as being outside the guidelines and requirements of this Act."

construction, Congress intended that the Administrator issue effluent limitations through regulations promulgated under § 301(b), 33 USC § 1311(b). That section provides:

"(b) In order to carry out the objective of this Act there shall be achieved—

(1)(A) not later than July 1, 1977, effluent limitations for point sources, other than publicly owned treatment works, (i) which shall require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 304(b) of this Act. . . .

. . . .

(2)(A) not later than July 1, 1983, effluent limitations for categories and classes of point sources other than publicly owned treatment works, which (i) shall require application of the best available technology economically achievable . . . as determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act."

The Administrator asserts that he has combined his rule-making authority under this section with that specifically provided for under § 304(b), 33 USC § 1314(b), to arrive at the comprehensive set of regulations which are here

under review. Since § 509 of the Act states that actions of the Administrator under § 301 are directly reviewable by courts of appeals, the EPA asserts that the district court was correct in dismissing the complaint for lack of jurisdiction.

Appellants, on the other hand, while not challenging the right of this court to directly review any action of the Administrator under § 301, contend that he lacks authority to issue effluent limitation regulations under the provisions of that section. They argue that the language of § 301 requires only that effluent limitations be "achieved," not that they be independently established and achieved. Thus, according to their interpretation of the Act, § 301 merely sets forth the statutory objectives to be attained, and the means of actually reaching these objectives are set out in § 304 of the Act, 33 USC § 1314, which states in part:

> "(a)(1) The Administrator . . . shall develop and publish . . . criteria for water quality. . . .
>
> "(b) For the purpose of adopting or revising effluent limitations under this Act the Administrator shall . . . publish . . . regulations providing guidelines for effluent limitations. . . . Such regulations shall—
>
> "(B) specify factors to be taken into account in determining the best measures and practices available to comply with subsection (b)(2) of section 301 of this Act. . . ."

The challenged regulations must, therefore, according to appellants, be deemed to have been issued under § 304(b) and neither under § 301 nor a combination of § 301 and § 304(b) as the EPA asserts. Based upon this interpretation of the statutory provisions in issue, appellants contend that review in the courts of appeals pursuant to § 509(b)(1) is not available and that the action was properly brought before the court below in accordance with the provisions of the Administrative Procedure Act, 5 USC § 701 et seq. As a corollary to this construction, appellants seek a ruling that the effluent limitations for existing point sources issued by EPA are invalid because

they say the Administrator had no authority to issue them under § 301, and could only have issued them under § 304(b).

The case of *CPC International, Inc. v. Train*, 515 F.2d 1032 (8th Cir. 1975), appears to agree with appellants' interpretation of the statutory provisions involved. In that case, the court stressed the fact that § 301 provides the Administrator with no separate power to promulgate effluent limitations for existing point sources. The court noted,

> "[o]ther sections of the Act demonstrate that the omission of such a provision [providing for the issuance of regulations under § 301] was not an oversight, for Congress provided unambiguously for the promulgation of national standards in other sections of the Act. Nationally promulgated standards were expressly mandated for § 306(b)(1)(B). . . ." 515 F.2d at 1038.

Thus, the court concluded that jurisdiction to review such actions of the EPA, which were deemed to have been taken in accordance with § 304(b), did not lie in the courts of appeals because the EPA could not promulgate effluent limitations for existing sources by regulations under § 301.

The court below, on the other hand, ruled that the effluent limitations standards at issue were promulgated pursuant to § 301 "apart from § 402 permit proceedings," and, as a result, it lacked jurisdiction to review. The court pointed first to § 509(b)(1)(E), which refers to judicial review of the Administrator's actions "in approving or promulgating any effluent limitation[s] or other limitation[s] under sections 301, 302, or 306" as supportive of the proposition that effluent limitations could be issued under § 301. In addition, the court noted that § 402(a) requires that permits issued thereunder meet the applicable requirements under § 301, and we note that under § 509(b) review of the action of EPA in issuing a permit is in the courts of appeals. The district court also noted it was of opinion the Administrator had authority under § 301(b)

to promulgate the regulations pursuant to his authority under § 304(b) and concluded that challenges to the effluent limitations must be handled in the courts of appeals.

This or related questions have also been considered by several other courts faced with challenges to EPA regulations under this statute. The Third Circuit, in *American Iron and Steel Institute v. EPA*, 8 ERC 1321 (3d Cir. 1975), disagreed with the reasoning of the Eighth Circuit in *CPC* and concluded that the Administrator was authorized to issue single number effluent limitations under § 301. The jurisdictional question was apparently not raised there. That court considered such effluent limitations as a uniform ceiling, the maximum amount of pollutant in effluent discharge which is permissible. And it also gave effect to § 304 by requiring compliance with it by EPA in preparing meaningful guidelines and addressing statutory factors for application to industry. Since it found § 304 was not complied with by EPA, the court set aside the issued effluent limitations because the limitations might have been less stringent if the statute (§ 304) had been followed in issuing the guidelines and consideration of statutory and individual factors.

In *American Meat Institute v. Environmental Protection* [*sic*, Agency], No. 74-1394 (7th Cir. 1975), the jurisdictional problem was also considered. The court held it had jurisdiction for it considered the effluent limitations were issued under § 301 of the Act. The court stated "the most rational reading of the language of the Act is that § 301 is a source of authority to promulgate effluent limitations, independent of the § 402 permit procedure." This part of the holding is then quite similar to that of the district court in our case. The Seventh Circuit also depended on *Train v. National Resources Defense Council*, 421 US 60 (1975); gave weight to the EPA's construction of the statute; and found it was "sufficiently reasonable to preclude . . . [the court] from substituting its judgment for that of the agency." We express no opinion as to the validity of this latter proposition in the context of a court determining its own jurisdiction which, of course, is conferred by Congress, *Lockerty v. Phillips*, 319 US 182, 187 (1943), and we need not in order to arrive at our conclusion.

In *American Petroleum Institute v. Train*, 7 ERC 1795 (D. Colo. 1974), the court concluded it lacked jurisdiction since the challenged regulations were issued under § 301 as well as § 304, and review should be had in the courts of appeals "even should the Administrator have interpreted his authority under [§ 301] incorrectly." Finally, the court, in *American Paper Institute v. Train*, 381 F. Supp. 553 (D.D.C. 1974), likewise found it lacked jurisdiction to review the challenged regulations even if they were guidelines under § 304 for in that event they would be "only an aid in establishing effluent limitations and since limitations, not guidelines, comprise the standards of performance for the issuance of permits, plaintiff [could not] be heard to complain that it [was] '*adversely affected or aggrieved*' by guidelines, the criteria of section 10(a) of the APA."

Thus, the parties to this dispute point to authority in support of their respective positions. We are of opinion, however, that the central question addressed by both the Eighth Circuit and the district court below, as well as some of the other cases, regarding the EPA's authority under § 301 should not necessarily be dispositive of the jurisdictional issue. Both courts have decided the substantive question of authority to issue the regulations under § 301 in order to reach the question of jurisdiction. With all deference to both courts, we think it unnecessary to decide the substantive question of authority to issue the regulations under § 301 alone in order to decide the question of which federal court has jurisdiction to review them.

We are impressed, as was the court below, by the express language of § 509(b)(1)(E) which refers to "review of the Administrator's action . . . in approving or promulgating any effluent limitation or other limitation under

section 301, 302, or 306." It is significant to note that section 306 provides for the issuance of regulations "establishing Federal standards of performance for *new* sources [of pollutants]." 33 USC § 1316 (emphasis added). Section 301, by way of contrast, is concerned with existing sources.[4] Were we to accept appellants' interpretation of the Act, review of regulations governing existing sources would lie in the district courts under the Administrative Procedure Act, while review of new source standards would be before the courts of appeals under § 509.[5] We do not conclude that Congress intended for review to be bifurcated in this manner.

While there is little legislative history relating to § 509, it is highly significant that the committee reports make no mention of any division of judicial review. It is clear that the House and Senate conferees disagreed over whether there should be judicial review in the district courts or the courts of appeals. Yet, there is no indication of any

[4] The terms "source" and "new source" are defined in the Act as follows:

"(2) The term 'new source' means any source, the construction of which is commenced after the publication of proposed regulations prescribing a standard of performance under this section which will be applicable to such source, if such standard is thereafter promulgated in accordance with this section.

"(3) The term 'source' means any building, structure, facility, or installation from which there is or may be the discharge of pollutants." 33 USC § 1316(a)(Supp. 1975).

[5] The practical difficulties occasioned by such a review procedure are illustrated by means of an example. Assume that an existing plant licensed under the Act expands. It is possible that the expanded portion of the plant would constitute a new point source within the meaning of § 306. In that event, the plant could be compelled to maintain two actions simultaneously, one in the district court and another in the court of appeals, in order to challenge the action of the Administrator. The jurisdictional overlap would only add to the complexities already inherent in the statute.

Recognizing the classical prohibition on residents of glass houses who throw rocks, with the Third Circuit we are yet constrained to say the Act is not clear. A simple declaratory sentence, or even a phrase, or a word, could have solved this knotty question, which relates to a substantial part of the industry in the country.

compromise agreement providing for divided review of the EPA standards. To the contrary, the Senate appears to have prevailed on this point. Leg. History (Conference Report), p. 330. A literal reading of the Conference Report without reference to the statute supports the position we take here.

In the House Report discussing judicial review, it was noted that "with the number and complexity of administrative determinations that the legislation requires there is a need to establish a clear and orderly process for judicial review." Although the House Bill originally provided for review in the district courts, this report indicates that Congress did not intend for the actions of the Administrator to be subjected to the complexities inherent in a system of review divided between different courts. Rather, it appears to have been its desire that administrative actions be reviewable, but in a manner not likely to impede enforcement unduly. Leg. History (House Report), p. 823.

The EPA contends that, this being the intent of Congress, § 301 must be viewed as authorizing the promulgation of effluent limitation regulations. Otherwise, they argue, § 509's reference to § 301 would be meaningless. We are not persuaded that this conclusion must necessarily follow in order for this court to find jurisdiction under § 509.

Even if § 301 merely sets out the technological objectives to be attained under the Act, courts of appeals may properly assume jurisdiction to review actions of the Administrator in issuing regulations to achieve these objectives. If § 301 is to be viewed in the manner advocated by the appellants, then § 304(b) must necessarily be deemed the key to the attainment of the objectives set forth in § 301. Thus, to obey the mandate of § 301, "guidelines for effluent limitations" must be promulgated under § 304(b). Construed in this light, any action taken by the Administrator under § 304(b) should properly be considered to be pursuant to the provisions of § 301 and, therefore, reviewable by this court under § 509.

By enacting § 509(b), Congress established a statutory plan to be followed to obtain judicial review of agency actions under the Act. Only those courts upon which Congress has bestowed authority have jurisdiction. See *Whitney Bank v. New Orleans Bank,* 379 US 411, 420, 422.

The district court correctly held it had no jurisdiction. None is conferred upon it by the statute involved. In federal courts, "[j]urisdiction is essentially the power conferred by Congress to decide a given type of case one way or the other." *Hagans v. Lavine,* 415 US 528, 538. In its exercise of its statutory jurisdiction, this court determines whether the Administrator acted within his statutory authority.

Since we are of opinion that Congress has conferred on the courts of appeals the power to decide the merits of this case one way or the other, and not conferred such power on the district courts, we think the judgment of the district court should be affirmed.

Accordingly, the district court was without jurisdiction, and its judgment, if not its entire opinion, is

AFFIRMED.

JUDGMENT

United States Court of Appeals

FOR THE FOURTH CIRCUIT

No. 74-2237

E. I. du Pont de Nemours and Company, Olin Corporation, FMC Corporation, American Cyanamid Company, Monsanto Company, The Dow Chemical Company, Allied Chemical Corporation and Hercules, Inc.

Appellants

v.

Russell T. Train, as Administrator, Environmental Protection Agency, and John R. Quarles, as Deputy Administrator, Environmental Protection Agency

Appellees

Appeal from the United States District Court for the Western District of Virginia.

This cause *came on to be heard on the record from the United States District Court for the Western District of Virginia, and was argued by counsel.*

On consideration whereof, *It is now here ordered and adjudged by this Court that the judgment of the said District Court appealed from, in this cause, be, and the same is hereby affirmed.*

William K. Slate, II
Clerk

APPENDIX B

E. I. DuPONT de NEMOURS AND COMPANY et al., Plaintiffs,

v.

Russell E. TRAIN et al., Defendants.
Civ. A. No. 74-57.

United States District Court,
W. D. Virginia,
Roanoke Division.
Sept. 27, 1974.

Robert C. Barnard, Douglas E. Kliever, and Charles F. Lettow, Cleary, Gottlieb, Steen & Hamilton, Washington, D. C., John L. Walker, Jr., Woods, Rogers, Muse, Walker & Thornton, Roanoke, Va., for plaintiffs.

Bruce J. Chasan, Dept. of Justice, Washington, D. C., Leigh B. Hanes, Jr., U.S. Atty. for the Western District of Virginia, Roanoke, Va., for defendants.

OPINION AND ORDER

TURK, Chief Judge.

This suit is brought by eight chemical manufacturers seeking declaratory and injunctive relief against the Administrator and Deputy Administrator of the Environment Protection Agency (EPA). The case is presently before the court pursuant to plaintiffs' motion for partial summary judgment and declaratory judgment and the defendants' motion to dismiss for lack of subject matter jurisdiction or alternatively to stay the proceedings.

Plaintiffs ultimately seek to have this court enjoin and set aside certain regulations promulgated by the Administrator of the EPA governing the effluent discharge of sulfuric acid plants on grounds that they are arbitrary, capricious, not supported by substantial evidence, beyond

the statutory authority of EPA and not in accord with procedures of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. § 1251 et seq. ("The Act") and the Administrative Procedure Act. Resolution of these allegations requires factual determinations and they are accordingly not now ripe for disposition. However, plaintiffs also raise several issues of statutory construction not dependent upon factual determinations and which may result in the disposition of the case at this time. The following issues are now before the court for resolution:

1. Whether the Administrator of the EPA has the authority under section 301(b) of the Act to issue regulations establishing effluent limitations for sulfuric acid plants;

2. Whether the regulations in question conform to section 304(b) of the Act and the notice and public participation provisions of the Administrative Procedure Act; and

3. Whether this court has jurisdiction to review the regulations in question and the procedures by which they were promulgated, or whether as defendants contend, this suit should be dismissed for lack of subject matter jurisdiction.

THE STATUTE

The Federal Water Pollution Control Act Amendments of 1972, while technically amending the Federal Water Pollution Control Act of 1965, 33 U.S.C. § 1151 et seq., is in effect a comprehensive statute in its own right. Section 101(a) of the Act states as its objective "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters," and states as two of its goals "that the discharge of pollutants into the Navigable waters be eliminated by 1985" and "that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983." Of primary interest to this suit are sec-

tions 301, 304 and 402, which establish the regulatory framework for achieving the above goals and section 509(b)(1) providing for judicial review of the Administrator's actions.

Section 301(a) makes it unlawful for any person to discharge any pollutant except as in compliance with certain enumerated sections of the Act including section 301. Section 301(b) then states:

"In order to carry out the objective of this Act, there shall be achieved—

"(1)(A) not later than July 1, 1977, effluent limitations for point sources . . . (i) which shall require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 304(b) of this Act. . . .

"(2)(A) not later than July 1, 1983, effluent limitations for categories and classes of point sources . . . which (i) shall require application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act, which such effluent limitations shall require the elimination of discharges of all pollutants if the Administrator finds, on the basis of information available to him (including information developed pursuant to section 315), that such elimination is technologically and economically achievable for a category or class of point sources as determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act. . . ."

Section 304(b) to which section 301(b) refers provides:

"For the purpose of adopting or revising effluent limitations under this Act the Administrator shall, after consultation with appropriate Federal and State agencies and other interested persons, publish within one year of [enactment of this title], regulations, providing guidelines for effluent limitations, and at least annually thereafter, revise, if appropriate, such regulations. Such regulations shall—

"(1)(A) identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of the best practicable control technology currently available for classes and categories of point sources . . .; and

"(B) specify factors to be taken into account in determining the control measures and practices to be applicable to point sources . . . within such categories or classes. Factors relating to the assessment of best practicable control technology currently available to comply with subsection (b)(1) of section 301 of this Act shall include consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application, and shall also take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate;

"(2)(A) identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of the best control measures and practices achievable including treatment techniques, process and procedure innovations, operating methods, and other alternatives for classes and categories of point sources . . .; and

"(B) specify factors to be taken into account in determining the best measures and practices available to comply with subsection (b)(2) of section 301 of this Act to be applicable to any point source . . . within such categories or classes. Factors relating to the assessment of best available technology shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate; and

"(3) identify control measures and practices available to eliminate the discharge of pollutants from

categories and classes of point sources, taking into account the cost of achieving such elimination of the discharge of pollutants."

The statutory scheme further provides for a national system of discharge permits known as the "National Pollutant Discharge Elimination System" (NPDES) to insure that the control levels established by the Act are achieved. Thus, section 402(a)(1) states:

"Except as provided in sections 318 and 404 of this Act, the Administrator may, after opportunity for a public hearing, issue a permit for the discharge of any pollutant, or combination of pollutants, notwithstanding section 301(a), upon condition that such discharge will meet either all applicable requirements under sections 301, 302, 306, 307, 308 and 403 of this Act, or prior to the taking of necessary implementing actions relating to all such requirements, such conditions as the Administrator determines are necessary to carry out the provisions of the Act."

Section 402(b-e) further provides that the permit issuing authority be given to the individual states which submit a program which meets the requirements of the Act, although the Administrator retains the power to prevent the issuance of a permit he deems to be "outside the guidelines and requirements of this Act." § 402(d)(2).

Section 509(b) provides for judicial review of the Administrator's determinations:

"(1) Review of the Administrator's action (A) in promulgating any standard of performance under section 306, (B) in making any determination pursuant to section 306(b)(1)(C), (C) in promulgating any effluent standard, prohibition, or treatment standard under section 307, (D) in making any determination as to a State permit program submitted under section 402(b), (E) in approving or promulgating any effluent limitation or other limitation under section 301, 302, or 306, and (F) in issuing or denying any permit under section 402, may be had by any interested person in the Circuit Court of Appeals of the United States for the Federal judicial district in which such person resides or transacts such business upon appli-

cation by such person. Any such application shall be made within ninety days from the date of such determination, approval, promulgation, issuance or denial, or after such date only if such application is based solely on grounds which arose after such ninetieth day.

"(2) Action of the Administrator with respect to which review could have been obtained under paragraph (1) of this subsection shall not be subject to judicial review in any civil or criminal proceeding for enforcement."

THE REGULATIONS

On August 6, 1973, the EPA published notice of proposed rulemaking "with respect to effluent limitations, guidelines, standards of performance and pretreatment standards for new sources." 38 Fed.Reg. 21202. On October 11, 1973, EPA published notice of proposed rulemaking for 40 C.F.R. Part 415, "Effluent Limitations Guidelines and Standards of Performance and Pretreatment for Inorganic Chemicals Manufacturing Point Source Category." 38 Fed.Reg. 28174 et seq. These proposed regulations subdivided the inorganic chemicals manufacturing category into twenty-two sub-categories, each representing a different chemical, including sulfuric acid. With respect to sulfuric acid, the proposal discussed the three principal methods of manufacture—double absorption plants, single absorption plants and spent acid plants—and stated that the proposed regulations would not apply to spent acid plants. However, the proposed regulations for both single and double absorption plants established the standard of "no discharge of process waste water pollutants to navigable waters" both "after application of the best practicable control technology currently available" and "after application of the best available technology economically achievable." 38 Fed.Reg. 28192. After receiving additional comments, including comments from seven of the plaintiffs to this suit, 39 Fed.Reg. 9612, final regulations were issued on March 12, 1974 for 40 C.F.R. Part 415 (Inorganic Chemicals Manufacturing Point Source Category). The Administrator declined to change the basic proposed regulations for sulfuric acid production, and the "no discharge of process waste water pollutants" went into effect. 40 C.F.R. §§ 415.212, 415.213, 39 Fed.Reg. 9634. The proposed regulations for sulfuric acid production (as well as other subcategories in the Inorganic Chemicals Manufacturing Group) were modified with regard to the limitations representing best practicable control technology currently available (40 C.F.R. § 415.212), by providing that the "no discharge" standard might be adjusted for certain plants by the Regional Administrator or the State in issuing an NPDES permit; according to the regulation, such an adjustment could be made on the basis of a showing that certain factors peculiar to the discharger are "fundamentally different" than the factors considered in formulating the regulation. 40 C.F.R. § 415.212, 39 Fed.Reg. 9634.

I

Plaintiffs' statutory construction argument is essentially that the regulations for sulfuric acid plants are not valid effluent "guidelines" complying with the requirements of section 304(b). They contend that the word "guidelines" in section 304(b) is a term of art which contemplates the administrative promulgation of broadly outlined regulations to serve as a starting point for the development of specific restrictions which would then be individualized for each discharger by way of permits issued by the Regional Administrator or State pursuant to § 402 with such permits embodying the "limitations" to be "achieved" pursuant to § 301. In support of this construction plaintiffs note that § 304(b) requires that the guidelines to be published as regulations contain two elements: (1) the degree of effluent reduction "attainable" by 1977 using the "best practicable control technology currently available" and by 1983 using the "best available control measures and practices achievable" for classes and categories of

point sources; and (2) a specification of the factors to be taken into account in determining the control measures applicable to point sources within such categories or classes in order to attain these goals. Thus plaintiffs argue that the regulations were intended to be flexible guidelines and not prescriptive rules applicable across the board to all plants in a given category (i. e. sulfuric acid plants); and the permit granting agency would look to the guidelines for determining the degree of effluent limitation attainable for a given plant.

Plaintiffs specifically contend that the regulations for sulfuric acid plants fail to discuss the statutory factors and hence provide no guidance to the permit-granting authorities. Furthermore, they contend that the EPA's construction and implementation of the Act would frustrate the intent of Congress in allowing the States to play a major role in implementing the Act. They argue that by making the regulations binding prescriptions in the form of specific limitations instead of a "range" of discharge levels together with factors to be taken into account for discrete industrial categories, the EPA has deprived the States of discretion in administering the NPDES program. This is said to be contrary to the intent of Congress expressed in § 101(b) of the Act "to recognize, preserve, and protect the primary responsibilities and rights of the States to prevent, reduce, and eliminate pollution. . . ."

Based on their construction of the Act, plaintiffs then contend that review in the Court of Appeals pursuant to § 509(b)(1) of the Act is not available to challenge the regulations constituting effluent guidelines under § 304(b). Since § 509(b) provides only for review of EPA actions under sections 301, 302, 306, 307 and 402 of the Act, review of other regulatory actions by the EPA as well as certain other agencies empowered to act under the Act would proceed under the Administrative Procedure Act, 5 U.S.C. § 702, and through other jurisdictional statutes such as

the Mandamus and Venue Act of 1962, 28 U.S.C. § 1361.[1] Thus plaintiffs argue that review of § 304(b) guidelines is not encompassed by § 509(b). In support of this position, plaintiffs point out that each of the sections specified in § 509(b) allow regulatory actions by the EPA which may then be enforced by the Administrator pursuant to § 309 or by "any citizen" pursuant to § 505 by way of a civil suit in the district court. They argue that actions taken pursuant to sections not specified in § 509(b), including guidelines issued pursuant to § 304(b), require further implementing steps, and hence a decision of broad precedential effect by a Court of Appeals was not deemed necessary in the first instance.

In contrast, defendants contend that the Act contemplates that the Administrator promulgate actual effluent limitations which will then be uniformly applied by the Administrator or the states in issuing NPDES permits under section 402. According to their construction, section 304(b) guidelines have no direct relationship to permit proceedings under section 402, but merely provide a basis for establishing the effluent limitations. They accordingly argue that the regulations are effluent limitations properly established pursuant to section 301(b).

Defendants view the regulations in question, 45 C.F.R. §§ 415.212, 415.213, as valid effluent limitations promulgated pursuant to section 301(b) with the fixed number of zero for the discharge of process waste water from sulfuric acid plants being the established limitation. In addition they contend that 45 C.F.R. Part 415 establish the "guidelines" required by section 304(b) by subdividing the inorganic chemical manufacturing group into 22 sub-

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[1] As a basis for jurisdiction to review what they consider to be section 304(b) "guidelines" plaintiffs also cite 28 U.S.C. §§ 1331, 1332, 1337 and 1651; the Declaratory Judgment Act, 28 U.S.C. §§ 2201-2202; and the Administrative Procedure Act, 5 U.S.C. §§ 701-706.

categories of specific chemicals.[2] Thus defendants contend that the regulations are "guidelines" issued pursuant to section 304(b) by way of subcategorization, but are effluent limitations in terms of the specific numerical restrictions imposed.

On the basis of this construction, defendants argue that jurisdiction to review the regulations is exclusively in the Court of Appeals pursuant to section 509(b)(1)(E). Furthermore, it is asserted that since the "guidelines" are intertwined with and provide a definitional basis for the limitations, they should also be reviewed in the Court of Appeals.

II

The issue of statutory construction presented in this case is one of first impression[3] in which the court must seek the intent of Congress from the words and structure of the statute and its legislative history. Although the varying interpretations of the Act presented by the parties both find support in the statute and its history, for the reasons which follow the court concludes: (1) that the Administrator was authorized to promulgate by regulation the

[2] The Administrator's approach was explained in the regulations as follows:

> The approach taken in developing effluent limitations guidelines and standards of performance for the inorganic chemicals manufacturing industry was to examine all variables and segment the industry into workable subcategories consistent with these variations. Twenty-two subcategories have been established based on the chemical product manufactured. In cases where two dissimilar processes are used to manufacture the same product separate limitations have been established within the subcategory. Thus, ranges are provided for, as are other factors, by segmenting the inorganic chemicals manufacturing point source category into discrete subcategories, each with its own limitation. 39 Fed.Reg. 9612 (March 12, 1973).

[3] Plaintiffs cite Natural Resources Defense Council v. Train, 6 E.R.C. 1033 (D.D.C. 1973) in support of their construction of the Act. That case involved a suit to compel the Administrator to publish effluent limitation guidelines after expiration of the time period established by the Act. However, that case did not consider the issue of statutory construction now presented.

effluent limitations in issue; (2) that the structural and content requirements of such regulations under section 304(b) were satisfied; and (3) that judicial review of these limitations and guidelines is exclusively in the Court of Appeals under section 509(b)(1)(E).

1.

[1] Taken as a whole, the various sections of the Act support the defendants' construction that section 301(b) effluent limitations were intended to be promulgated as regulations apart from section 402 permit proceedings. This is implicitly supported by section 509(b)(1)(E) which provides for review of the Administrator's actions "in approving or promulgating any effluent limitation or other limitation under section 301, 302, or 306. . . ." The independence of such limitations is also implicit in section 505 which provides in subsection (a) for any citizen to sue for a violation of "an effluent standard or limitation under this Act"; but even more revealing is section 505(f) which defines "effluent standard or limitation under this Act" to include six separate definitions among which are: "(1) effective July 1, 1973, an unlawful act under subsection (a) of section 301 of this Act, (2) an effluent limitation or other limitation under section 301 or 302 of this Act; . . ." or (6) "a permit or condition thereof issued under section 402 of this Act. . . ." Obviously under plaintiffs' construction of the Act the second definition quoted above would be redundant with the sixth. Plaintiffs have offered no explanation for this apparent inconsistency with their position.

Plaintiffs would avoid the implication of section 509(b)(1)(E) by construing the word "promulgating" in section 509(b)(1)(E) as applying only to section 302 and the word "approving" as having application to effluent limitations under sections 301 or 306. In support of this construction, plaintiffs point out that section 402(b) allows a state to develop a plan for issuing permits and thus displace the Administrator's authority to issue permits; and further that section 402(d) provides a check on the states

by allowing the Administrator to veto a permit issued by the state:

> "(d)(1) Each State shall transmit to the Administrator a copy of each permit application received by such State and provide notice to the Administrator of every action related to the consideration of such permit application, including each permit proposed to be issued by such State.
>
> "(2) No permit shall issue . . . (b) if the Administrator within ninety days of the date of transmittal of the proposed permit by the State objects in writing to the issuance of such permit as being outside the *guidelines and requirements of this Act*. (plaintiffs' emphasis).

From these sections, plaintiffs argue that the use of "approving" in section 509(b)(1)(E) was in reference to the Administrator's action in reviewing effluent limitations under section 301(b) or standards of performance under section 306 [4] which would be set by the States in permits. They further contend that such approval was a necessary element inasmuch as such a federal connection to a state program was necessary in order to justify review in the federal courts. On the other hand, plaintiffs argue that section 302 [5] provides for the promulgation of effluent

[4] Section 306(b) provides that the Administrator shall publish regulations "establishing Federal standards of performance for new sources" within a category of sources. Plaintiffs point out that section 509(b)(1)(A) specifically provides for review of these "standards of performance." Section 306(c) authorizes the states to develop a procedure for applying and enforcing standards of performance for new sources located within the state which may then be approved by the Administrator. Plaintiffs contend that the implementation of these standards of performance would occur in permit proceedings which would be subject to approval by the Administrator in a manner similar to section 301(b) effluent limitations.

[5] Section 302(a) authorizes the Administrator to "establish" "water quality" related "effluent limitations" when he finds that

> "discharges of pollutants from a point source or group of point sources, with the application of effluent limitations required under section 301(b)(2) (the technology-based limitations to be achieved by 1983), would interfere with the attainment or maintenance of that water quality in a specific portion of the navigable waters which shall assure protection of public water supplies. . . ."

limitations by the Administrator in certain defined situations without a provision for state implementation. This is said to explain the use of "promulgating" in section 509(b)(1)(E).

Such a construction of section 509(b)(1)(E) is unconvincing for several reasons. First, section 302 does not require that effluent limitations be "promulgated"; rather it states that "effluent limitations . . . shall be established." The court fails to see a distinction between the establishment of limitations under section 302 and the achievement of limitations under section 301(b) particularly in view of the language used in section 301(e):

> "Effluent limitations, established pursuant to this section or section 302 of this Act shall be applied to all point sources of discharge of pollutants in accordance with the provisions of this Act."

Similarly section 302(c) provides:

> "The establishment of effluent limitations under this section shall not operate to delay the application of any effluent limitation established under section 301 of this Act."

Second, plaintiffs' construction of the interrelationship between section 509(b)(1)(E) and section 402(d)(1) and (2) ignores the fact that sections 402(d)(3), 402(e) and 402(f) allow the Administrator to waive review of permits issued by the States, and thus in such situations, by plaintiffs' analysis, there would be no federal judicial review under section 509(b)(1). Finally, the reference to "guidelines and requirements of this Act" in section 402(d)(2) would appear to be section 304(h) guidelines [6] (as opposed to section 304(b) guidelines) in view of the references to "guidelines" in sections 402(b), 402(c)(1), and 402(c)(2) and 402(e) being specifically to section 304(h) guidelines.

Even more strongly suggestive of the conclusion that section 301(b) limitations were intended to be promulgated as regulations is the interrelationship between sec-

[6] These pertain to the procedural requirements of a state-operated permit program.

tion 301(b) and 304(b). Thus the requirements of sections 304(b)(1)(A) and 304(b)(2)(A) that the Administrator publish regulations which identify the degree of effluent reduction attainable by 1977 and 1983 appears to contemplate the issuance of actual effluent limitations which are referred to in section 301(b)(1)(A) as being "defined by the Administrator pursuant to section 304(b) of this Act" and in section 301(b)(2)(A) as being "determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act. . . ."

Both plaintiffs and defendants quote the definition of effluent limitation in section 502(11) in support of their respective interpretations of the Act:

> "The term 'effluent limitation' means any restriction established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance."

Plaintiffs argue that since a state cannot issue regulations the definition indicates that effluent limitations do not involve regulations and that the definition contemplates that both the states and the EPA will have a shared role in establishing effluent limitations. However, the court does not perceive this definition as being inconsistent with the defendants' construction of the Act and the regulations herein challenged since the effluent limitations promulgated by the Administrator may nevertheless be "established" for a given discharger through a permit issued by a state which has satisfied the requirements of section 402.

Further support for the conclusion that NPDES permits issued pursuant to section 402 would embody the effluent limitations previously established by the Administrator is implicit in the fact that section 402(a) requires that such permits meet the "applicable requirements under section 301" but omits any reference to section 304(b) guidelines.

[2] As noted, the regulations herein challenged establish the number of zero as the effluent limitation for both single and double absorption plants. The court is of the opinion from a consideration of the structure and wording of the Act that the Administrator had the authority to promulgate such limitations under section 301(b) pursuant to his authority under section 304(b). It follows that plaintiffs' substantive challenge to such limitations must be brought in the Court of Appeals pursuant to section 509(b)(1)(E).

2.

Plaintiffs further challenge the regulations in question for failing to specify the factors to be taken into account in determining the control measures and practices to be applicable to point sources within such categories or classes, as required by section 304(b)(1)(B) and 304(b)(2)(B). As noted, defendants argue that the subcategorization in effect establishes "guidelines" under section 304(b). They contend that variations in plant age, size, manufacturing processes, raw materials, etc. (section 304(b)(1)(B) and 304(b)(2)(B) factors) were taken into account by such subcategorization. They further argue that this approach is consistent with the statutory scheme and facilitates the achievement of reasonably uniform limitations for similar point sources under section 301 of the Act.

The court notes that although the factors were not set forth as regulations as such, the regulations do indicate that the factors were considered. The regulations in question also indicate that the effluent limitations established could be varied for an individual discharger in an NPDES permit upon a showing "that factors relating to the equipment or facilities involved, the processes applied or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. . . ." 39 Fed.Reg. 9634; 45 C.F.R. § 415.212. In addition, defendants assert (and the regulations note) that the factors in question are analysed in a "Development Document."

[3] In view of the aforementioned conclusion that sections 301(b) and 304(b) intend that the Administrator will publish effluent limitations for classes and categories of point sources, the court is of the opinion that the approach taken by the Administrator in specifying factors is in accord with section 304(b). In this regard it must be noted that the factors required to be specified under section 304(b) were not intended to exist in a vacuum. Rather, both sections 304(b)(1)(B) and 304(b)(2)(B) respectively require such factors in reference to "the assessment of best practicable control technology currently available to comply with subsection (b)(1) of section 301" and "the best measures and practices available to comply with subsection (b)(2) of section 301". Thus the statute appears to contemplate the incorporation of such factors in the effluent limitations established under section 301, which was apparently done in this case. Accordingly, the court believes that any challenge to the Administrator's consideration of various factors or the weight given to each, like the challenge to the actual numerical limitations, is in essence a challenge to the Administrator's action in promulgating effluent limitations under section 301 and must be pursued under section 509(b)(1)(E) in the Court of Appeals.

[4] The court further is of the opinion that section 509(b) is consistent with the above construction of the Act. It is reasonable to assume that by providing original judicial review in the Courts of Appeals of effluent limitations under section 509(b) along with strict time limitations and prohibitions on review by way of criminal or other civil proceedings, Congress sought to establish expeditious and consistent application of limitations.[7] However, by plaintiffs' construction of the Act, actual effluent limitations would always be individualized for dischargers in NPDES permits, thus limiting the broad precedential effect of any judicial decision approving or rejecting any such limitation. Furthermore, if plaintiffs could challenge section 304(b) guidelines in the district court and section 301(b) limitations in the Court of Appeals, this would create duplicative litigation because of the close interrelationship between these sections and the fact that the administrative record in each suit would be virtually identical. In addition, any successful challenge to guidelines in the district court would affect the limitations which could only be challenged in the Court of Appeals and would thus hinder the goal of prompt judicial review.

[7] There is very little legislative history relative to section 509(b). The bill as originally passed by the House provided for judicial review in the district courts whereas the Senate bill provided for review of certain administrative actions in the Court of Appeals for the District of Columbia and others in the Courts of Appeal for the appropriate circuit. H.R. 11896, 92d Cong., 2d Sess. § 509(b) (1972); S. 2770, 92d Cong., 1st Sess. § 509(b).

3.

The legislative history of the Act is generally consistent with the stated conclusions concerning the relationship between sections 301, 304 and 402 and the Administrator's authority to establish the effluent limitations in issue. Both the House Report accompanying H.R. 11896 and the Senate Report accompanying S. 2770 indicate that the Administrator is to establish specific effluent limitations for subcategories of point sources. Thus the House Report stated:

> As required in section 304(b)(1)(A), *the administrator, by regulations, is to identify the degree of effluent reduction attainable by the application of the best practicable control technology currently available for classes and categories of point sources.* By this the Committee expects that the Administrator will concentrate on, but not be limited to, those categories of point sources enumerated in section 306(b)(1)(A) and any which the Administrator might add to that list. *The Committee expects that the identification will be in objective terms and will set out actual performance levels for the classes and categories of point sources rather than prescribing specific control techniques, processes or equipment.*" H. Rep., No. 92-911, 92d Cong., 2d Sess., 107 (1972), reprinted in Senate Committee on Public Works, Committee Print, A

> Legislative History of the Water Pollution Control Act Amendments of 1972, 93d Cong. 1st Sess., at 794 (1973) (hereinafter "Legislative History"). (emphasis added).

The Senate Report similarly indicates that effluent limitations will be established by regulations, and in addition indicates that the defendants' approach in incorporating factors into such limitations is consistent with the statutory scheme.

> "It is the Committee's intention that pursuant to subsection 301(b)(1)(A), and Section 304(b) the Administrator will interpret the term 'best practicable' when applied to various categories of industries as a basis for specifying *clear and precise effluent limitatations* to be implemented by January 1, 1976. *In defining best practicable for any given industrial category, the Committee expects the Administrator to take a number of factors into account.* These factors should include the age of the plants, their size and unit processes involved and the cost of applying such controls. In effect, for any industrial category, the Committee expects the Administrator to define a range of discharge levels, above a certain base level applicable to all plants within that category. In applying effluent limitations to any individual plant, the factors cited above should be applied to the specific plant. In no case, however, should any plant, be allowed to discharge more pollutants per unit of production than is defined by that base level." S.Rep. No. 92-414, 92 Cong., 1st Sess. p. 50, U.S. Code Cong. & Admin. News 1972, p. 3716; Legislative History at 1468. (emphasis added).

Plaintiffs argue that the reference to the Administrator establishing a "range of discharge levels" supports their construction of the Act. However, by creating narrow subcategories of point sources subject to different limitations, the Administrator has in effect created a range of discharge levels for various categories of point sources—in this case the category being inorganic chemicals manufacturing. In any case, the determination herein challenged set the limitation of "no discharge of process waste water" for two types of sulfuric acid plants, indicating that in the Administrator's opinion a range of numbers was inappropriate. Whether the substance of this decision was correct is, as noted above, to be challenged under section 509(b)(1)(E) in the Court of Appeals.

In the Conference Report on S. 2770 the following was stated with respect to section 304(b):

> "In determining the 'best available technology' for a particular category or class of point sources, the Administrator is directed to consider the cost of achieving effluent reduction. *The Conferees intend that the factors described in section 304(b) be considered only within classes or categories of point sources and that such factors not be considered at the time of application of an effluent limitation to an individual point source within such a category or class.*
>
> "Except as provided for in section 301(c) of the Act, the intent is that effluent limitations applicable to individual point sources within a given category or class be as uniform as possible. The Administrator is expected to be precise in his guidelines so as to assure that similar point sources with similar characteristics, regardless of their location or the nature of the water into which the discharge is made, will meet similar effluent limitations.
>
> "The Conferees have provided, however, a mechanism for individual point source-by-source consideration in section 301(c). That section provides that the Administrator may modify any effluent limitation based on 'best available technology' to be achieved by July 1, 1983, with respect to any point source, upon a showing by the owner or operator of such point source that an effluent limitation so modified will represent the maximum use of technology within the economic capability of the operator and will result in reasonable further progress toward the goal of the elimination of the discharge of pollutants." 118 Cong.Rec. S. 16874 (daily ed., Oct. 4, 1972; Legislative History at 172. (emphasis added).

This quotation appears to be basically consistent with defendants' interpretation of the Act. Specifically it supports the defendants' construction that section 304(b) factors

may be utilized to create subcategories subject to uniform, specific effluent limitations and refutes plaintiffs' contention that such factors are to have an independent status for the purpose of establishing discharge levels for individual plants.

4.

Plaintiffs have raised a final contention concerning the promulgation of the regulations in question which is a concomitant to their other allegations based on their construction of the statute. They argue that in issuing the regulations for inorganic chemicals, the Administrator failed to adhere to the notice and opportunity-to-comment requirements of the Administrative Procedure Act, 5 U.S.C. § 553. There is apparently no dispute that notice of proposed rulemaking was published in the Federal Register on August 6, 1973 (38 Fed.Reg. 21202) and October 11, 1973 (38 Fed.Reg. 28174) and extensive comments were received from the public, including the plaintiffs. The final regulations issued on March 12, 1974 summarized the major comments received since the October 11 notice of proposed rulemaking.

The plaintiffs now contend however that they approached the proposed regulations on the assumption that such regulations would be flexible "guidelines" issued under section 304(b) and not actual effluent limitations to be mechanically applied to all plants in a given subcategory. Thus they argue that by promulgating actual effluent limitations, the Administrator rendered ineffective the notice and public participation requirements of the APA.

Although the record before the court tends to belie plaintiffs' allegations of surprise and prejudice, the court does not now decide this claim. Rather, the court is of the opinion that in view of its construction of the Act, supra, review of this procedural claim should also proceed in the Court of Appeals. Section 509(b)(1)(E) provides for jurisdiction in the Court of Appeals to review "the Administrator's action" in "promulgating any effluent limitation or

other limitation under section 301." This jurisdictional section is unqualified, and the court perceives no reason why review of the adequacy of notice and public participation regarding regulations which establish effluent limitations, should not proceed in the same manner as a suit challenging the substantive action of the Administrator in setting particular limitations.

To summarize, the court concludes that the regulations herein challenged are effluent limitations established by the Administrator pursuant to section 301(b) and 304(b); and that review of both the substance of such limitations and the procedures utilized in establishing the same is exclusively in the Court of Appeals pursuant to section 509 (b)(1)(E). Accordingly, for the reasons stated defendants' motion to dismiss this suit for lack of subject matter jurisdiction is hereby granted.

APPENDIX C

The pertinent provisions of the Federal Water Pollution Control Act, as amended, 33 U.S.C. §§ 1251 *et seq.*, are as follows:

§ 1251. Congressional declaration of goals and policy

(a) The objective of this chapter is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. In order to achieve this objective it is hereby declared that, consistent with the provisions of this chapter—

(1) it is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985;

(2) it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983;

(3) it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited;

(4) it is the national policy that Federal financial assistance be provided to construct publicly owned waste treatment works;

(5) it is the national policy that areawide waste treatment management planning processes be developed and implemented to assure adequate control of sources of pollutants in each State; and

(6) it is the national policy that a major research and demonstration effort be made to develop technology necessary to eliminate the discharge of pollutants into the navigable waters, waters of the contiguous zone, and the oceans.

(b) It is the policy of the Congress to recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution, to plan the development and use (including restoration, preservation, and enhancement) of land and water re-

sources, and to consult with the Administrator in the exercise of his authority under this chapter. It is further the policy of the Congress to support and aid research relating to the prevention, reduction, and elimination of pollution, and to provide Federal technical services and financial aid to State and interstate agencies and municipalities in connection with the prevention, reduction, and elimination of pollution.

(c) It is further the policy of Congress that the President, acting through the Secretary of State and such national and international organizations as he determines appropriate, shall take such action as may be necessary to insure that to the fullest extent possible all foreign countries shall take meaningful action for the prevention, reduction, and elimination of pollution in their waters and in international waters and for the achievement of goals regarding the elimination of discharge of pollutants and the improvement of water quality to at least the same extent as the United States does under its laws.

(d) Except as otherwise expressly provided in this chapter, the Administrator of the Environmental Protection Agency (hereinafter in this chapter called "Administrator") shall administer this chapter.

(e) Public participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan, or program established by the Administrator or any State under this chapter shall be provided for, encouraged, and assisted by the Administrator and the States. The Administrator, in cooperation with the States, shall develop and publish regulations specifying minimum guidelines for public participation in such processes.

(f) It is the national policy that to the maximum extent possible the procedures utilized for implementing this chapter shall encourage the drastic minimization of paperwork and interagency decision procedures, and the best use of available manpower and funds, so as to prevent needless

duplication and unnecessary delays at all levels of government.

§ 1311. Effluent limitations—Illegality of pollutant discharges except in compliance with law

(a) Except as in compliance with this section and sections 1312, 1316, 1317, 1328, 1342, and 1344 of this title, the discharge of any pollutant by any person shall be unlawful.

Timetable for achievement of objectives

(b) In order to carry out the objective of this chapter there shall be achieved—

(1) (A) not later than July 1, 1977, effluent limitations for point sources, other than publicly owned treatment works, (i) which shall require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 1314(b) of this title, or (ii) in the case of a discharge into a publicly owned treatment works which meets the requirements of subparagraph (B) of this paragraph, which shall require compliance with any applicable pretreatment requirements and any requirements under section 1317 of this title; and

(B) for publicly owned treatment works in existence on July 1, 1977, or approved pursuant to section 1283 of this title prior to June 30, 1974 (for which construction must be completed within four years of approval), effluent limitations based upon secondary treatment as defined by the Administrator pursuant to section 1314(d) (1) of this title; or,

(C) not later than July 1, 1977, any more stringent limitation, including those necessary to meet water quality standards, treatment standards, or schedules of compliance, established pursuant to any State law or regulations (under authority preserved by section 1370 of this title) or any other Federal law or regulation, or required to implement any applicable water quality standard established pursuant to this chapter.

(2) (A) not later than July 1, 1983, effluent limitations for categories and classes of point sources, other than publicly owned treatment works, which (i) shall require application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Administrator pursuant to section 1314(b) (2) of this title, which such effluent limitations shall require the elimination of discharges of all pollutants if the Administrator finds, on the basis of information available to him (including information developed pursuant to section 1325 of this title), that such elimination is technologically and economically achievable for a category or class of point sources as determined in accordance with regulations issued by the Administrator pursuant to section 1314(b) (2) of this title, or (ii) in the case of the introduction of a pollutant into a publicly owned treatment works which meets the requirements of subparagraph (B) of this paragraph, shall require compliance with any applicable pretreatment requirements and any other requirement under section 1317 of this title; and

(B) not later than July 1, 1983, compliance by all publicly owned treatment works with the requirements set forth in section 1281(g) (2) (A) of this title.

Modification of timetable

(c) The Administrator may modify the requirements of subsection (b)(2)(A) of this section with respect to any point source for which a permit application is filed after July 1, 1977, upon a showing by the owner or operator of such point source satisfactory to the Administrator that such modified requirements (1) will represent the maximum use of technology within the economic capability of the owner or operator; and (2) will result in reasonable further progress toward the elimination of the discharge of pollutants.

Review and revision of effluent limitations

(d) Any effluent limitation required by paragraph (2) of subsection (b) of this section shall be reviewed at least

every five years and, if appropriate, revised pursuant to the procedure established under such paragraph.

All point discharge source application of effluent limitations

(e) Effluent limitations established pursuant to this section or section 1312 of this title shall be applied to all point sources of discharge of pollutants in accordance with the provisions of this chapter.

Illegality of discharge of radiological, chemical, or biological warfare agents or high-level radioactive waste

(f) Notwithstanding any other provisions of this chapter it shall be unlawful to discharge any radiological, chemical, or biological warfare agent or high-level radioactive waste into the navigable waters.

§ 1312. Water quality related effluent limitations

(a) Whenever, in the judgment of the Administrator, discharges of pollutants from a point source or group of point sources, with the application of effluent limitations required under section 1311(b) (2) of this title, would interfere with the attainment or maintenance of that water quality in a specific portion of the navigable waters which shall assure protection of public water supplies, agricultural and industrial uses, and the protection and propagation of a balanced population of shellfish, fish and wildlife, and allow recreational activities in and on the water, effluent limitations (including alternative effluent control strategies) for such point source or sources shall be established which can reasonably be expected to contribute to the attainment or maintenance of such water quality.

(b) (1) Prior to establishment of any effluent limitation pursuant to subsection (a) of this section, the Administrator shall issue notice of intent to establish such limitation and within ninety days of such notice hold a public hearing to determine the relationship of the economic and social

costs of achieving any such limitation or limitations, including any economic or social dislocation in the affected community or communities, to the social and economic benefits to be obtained (including the attainment of the objective of this chapter) and to determine whether or not such effluent limitations can be implemented with available technology or other alternative control strategies.

(2) If a person affected by such limitation demonstrates at such hearing that (whether or not such technology or other alternative control strategies are available) there is no reasonable relationship between the economic and social costs and the benefits to be obtained (including attainment of the objective of this chapter), such limitation shall not become effective and the Administrator shall adjust such limitation as it applies to such person.

(c) The establishment of effluent limitations under this section shall not operate to delay the application of any effluent limitation established under section 1311 of this title.

§ 1314. Information and guidelines—Criteria development and publication

(a) (1) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall develop and publish, within one year after October 18, 1972 (and from time to time thereafter revise) criteria for water quality accurately reflecting the latest scientific knowledge (A) on the kind and extent of all identifiable effects on health and welfare including, but not limited to, plankton, fish, shellfish, wildlife, plant life, shorelines, beaches, esthetics, and recreation which may be expected from the presence of pollutants in any body of water, including ground water; (B) on the concentration and dispersal of pollutants, or their byproducts, through biological, physical, and chemical processes; and (C) on the effects of pollutants on biological community diversity, productivity, and stability, including information on the

factors affecting rates of eutrophication and rates of organic and inorganic sedimentation for varying types of receiving waters.

(2) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall develop and publish, within one year after October 18, 1972 (and from time to time thereafter revise) information (A) on the factors necessary to restore and maintain the chemical, physical, and biological integrity of all navigable waters, ground waters, waters of the contiguous zone, and the oceans; (B) on the factors necessary for the protection and propagation of shellfish, fish, and wildlife for classes and categories of receiving waters and to allow recreational activities in and on the water; and (C) on the measurement and classification of water quality; and (D) for the purpose of section 1313 of this title, on and the identification of pollutants suitable for maximum daily load measurement correlated with the achievement of water quality objectives.

(3) Such criteria and information and revisions thereof shall be issued to the States and shall be published in the Federal Register and otherwise made available to the public.

Effluent limitation guidelines

(b) For the purpose of adopting or revising effluent limitations under this chapter the Administrator shall, after consultation with appropriate Federal and State agencies and other interested persons, published within one year of October 18, 1972, regulations, providing guidelines for effluent limitations and, at least annually thereafter, revise, if appropriate, such regulations. Such regulations shall—

(1) (A) identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of the best prac-

ticable control technology currently available for classes and categories of point sources (other than publicly owned treatment works); and

(B) specify factors to be taken into account in determining the control measures and practices to be applicable to point sources (other than publicly owned treatment works) within such categories or classes. Factors relating to the assessment of best practicable control technology currently available to comply with subsection (b) (1) of section 1311 of this title shall include consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application, and shall also take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate;

(2) (A) identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of the best control measures and practices achievable including treatment techniques, process and procedure innovations, operating methods, and other alternatives for classes and categories of point sources (other than publicly owned treatment works); and

(B) specify factors to be taken into account in determining the best measures and practices available to comply with subsection (b) (2) of section 1311 of this title to be applicable to any point source (other than publicly owned treatment works) within such categories or classes. Factors relating to the assessment of best available technology shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate; and

(3) Identify control measures and practices available to eliminate the discharge of pollutants from categories and classes of point sources, taking into account the cost of achieving such elimination of the discharge of pollutants.

Pollution discharge elimination procedures

(c) The Administrator, after consultation, with appropriate Federal and State agencies and other interested persons, shall issue to the States and appropriate water pollution control agencies within 270 days after October 18, 1972 (and from time to time thereafter) information on the processes, procedures, or operating methods which result in the elimination or reduction of the discharge of pollutants to implement standards of performance under section 1316 of this title. Such information shall include technical and other data, including costs, as are available on alternative methods of elimination or reduction of the discharge of pollutants. Such information, and revisions thereof, shall be published in the Federal Register and otherwise shall be made available to the public.

Secondary treatment information; alternative waste treatment management techniques and systems

(d) (1) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall publish within sixty days after October 18, 1972 (and from time to time thereafter) information, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, on the degree of effluent reduction attainable through the application of secondary treatment.

(2) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall publish within nine months after October 18, 1972 (and from time to time thereafter) information on alternative waste treatment management techniques and systems available to implement section 1281 of this title.

Identification and evaluation of nonpoint sources of pollution; processes, procedures, and methods to control pollution

(e) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall issue to appropriate Federal agencies, the States, water pollution control agencies, and agencies designated under section 1288 of this title, within one year after October 18, 1972 (and from time to time thereafter) information including (1) guidelines for identifying and evaluating the nature and extent of nonpoint sources of pollutants, and (2) processes, procedures, and methods to control pollution resulting from—

(A) agricultural and silvicultural activities, including runoff from fields and crop and forest lands;

(B) mining activities, including runoff and siltation from new, currently operating, and abandoned surface and underground mines;

(C) all construction activity, including runoff from the facilities resulting from such construction;

(D) the disposal of pollutants in wells or in subsurface excavations;

(E) salt water intrusion resulting from reductions of fresh water flow from any cause including extraction of ground water, irrigation, obstruction, and diversion; and

(F) changes in the movement, flow, or circulation of any navigable waters or ground waters, including changes caused by the construction of dams, levees, channels, causeways, or flow diversion facilities.

Such information and revisions thereof shall be published in the Federal Register and otherwise made available to the public.

Guidelines for pretreatment of pollutants

(f) (1) For the purpose of assisting States in carrying out programs under section 1342 of this title, the Administrator shall publish, within one hundred and twenty days after October 18, 1972, and review at least annually thereafter and, if appropriate, revise guidelines for pretreatment of pollutants which he determines are not susceptible to treatment by publicly owned treatment works. Guidelines under this subsection shall be established to control and prevent the discharge into the navigable waters, the contiguous zone, or the ocean (either directly or through publicly owned treatment works) of any pollutant which interferes with, passes through, or otherwise is incompatible with such works.

(2) When publishing guidelines under this subsection, the Administrator shall designate the category or categories of treatment works to which the guidelines shall apply.

Test procedure guidelines

(g) The Administrator shall, within one hundred and eighty days from October 18, 1972, promulgate guidelines establishing test procedures for the analysis of pollutants that shall include the factors which must be provided in any certification pursuant to section 1341 of this title or permit application pursuant to section 1342 of this title.

Guidelines for monitoring, reporting, enforcement, funding, personnel, and manpower

(h) The Administrator shall (1) within sixty days after October 18, 1972, promulgate guidelines for the purpose of establishing uniform application forms and other minimum requirements for the acquisition of information from owners and operators of point-sources of discharge subject to any State program under section 1342 of this title, and (2) within sixty days from October 18, 1972, promulgate guidelines establishing the minimum procedural and other elements of any State program under section 1342 of this title which shall include:

(A) monitoring requirements;

(B) reporting requirements (including procedures to make information available to the public);

(C) enforcement provisions; and

(D) funding, personnel qualifications, and manpower requirements (including a requirement that no board or body which approves permit applications or portions thereof shall include, as a member, any person who receives, or has during the previous two years received, a significant portion of his income directly or indirectly from permit holders or applicants for a permit.)

Restoration and enhancement of publicly owned fresh water lakes

(i) The Administrator shall, within 270 days after October 18, 1972 (and from time to time thereafter), issue such information on methods, procedures, and processes as may be appropriate to restore and enhance the quality of the Nation's publicly owned fresh water lakes.

Agreements with Secretaries of Agriculture, Army, and Interior to provide maximum utilization of programs to achieve and maintain water quality; transfer of funds; authorization of appropriations

(j) (1) The Administrator shall, within six months from October 18, 1972, enter into agreements with the Secretary of Agriculture, the Secretary of the Army, and the Secretary of the Interior to provide for the maximum utilization of the appropriate programs authorized under other Federal law to be carried out by such Secretaries for the purpose of achieving and maintaining water quality through appropriate implementation of plans approved under section 1288 of this title.

(2) The Administrator, pursuant to any agreement under paragraph (1) of this subsection is authorized to transfer to the Secretary of Agriculture, the Secretary of the Army, or the Secretary of the Interior any funds appropriated under paragraph (3) of this subsection to supplement any funds otherwise appropriated to carry out

appropriate programs authorized to be carried out by such Secretaries.

(3) There is authorized to be appropriated to carry out the provisions of this subsection, $100,000,000 per fiscal year for the fiscal year ending June 30, 1973, and the fiscal year ending June 30, 1974.

§ 1316. National standards of performance—Definitions

(a) For purposes of this section:

(1) The term "standard of performance" means a standard for the control of the discharge of pollutants which reflects the greatest degree of effluent reduction which the Administrator determines to be achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants.

(2) The term "new source" means any source, the construction of which is commenced after the publication of proposed regulations prescribing a standard of performance under this section which will be applicable to such source, if such standard is thereafter promulgated in accordance with this section.

(3) The term "source" means any building, structure, facility, or installation from which there is or may be the discharge of pollutants.

(4) The term "owner or operator" means any person who owns, leases, operates, controls, or supervises a source.

(5) The term "construction" means any placement, assembly, or installation of facilities or equipment (including contractual obligations to purchase such facilities or equipment) at the premises where such equipment will be used, including preparation work at such premises.

Categories of sources; Federal standards of performance for new sources

(b) (1) (A) The Administrator shall, within ninety days after October 18, 1972, publish (and from time to time thereafter shall revise) a list of categories of sources, which shall, at the minimum, include:

pulp and paper mills;
paperboard, builders paper and board mills;
meat product and rendering processing;
dairy product processing;
grain mills;
canned and preserved fruits and vegetables processing;
canned and preserved seafood processing;
sugar processing;
textile mills;
cement manufacturing;
feedlots;
electroplating;
organic chemicals manufacturing;
inorganic chemicals manufacturing;
plastic and synthetic materials manufacturing;
soap and detergent manufacturing;
fertilizer manufacturing;
petroleum refining;
iron and steel manufacturing;
nonferrous metals manufacturing;
phosphate manufacturing;
steam electric powerplants;
feroalloy manufacturing;
leather tanning and finishing;
glass and asbestos manufacturing;
rubber processing; and
timber products processing.

(B) As soon as practicable, but in no case more than one year, after a category of sources is included in a list under subparagraph (A) of this paragraph, the Administrator shall propose and publish regulations establishing Federal standards of performance for new sources within such category. The Administrator shall afford interested persons an opportunity for written comment on such proposed regulations. After considering such comments, he shall promulgate, within one hundred and twenty days after publication of such proposed regulations, such standards with such adjustments as he deems appropriate. The Administrator shall, from time to time, as technology and alternatives change, revise such standards following the procedure required by this subsection for promulgation of such standards. Standards of performance, or revisions thereof, shall become effective upon promulgation. In establishing or revising Federal standards of performance for new sources under this section, the Administrator shall take into consideration the cost of achieving such effluent reduction, and any non-water quality environmental impact and energy requirements.

(2) The Administrator may distinguish among classes, types, and sizes within categories of new sources for the purpose of establishing such standards and shall consider the type of process employed (including whether batch or continuous).

(3) The provisions of this section shall apply to any new source owned or operated by the United States.

State enforcement of standards of performance

(c) Each State may develop and submit to the Administrator a procedure under State law for applying and enforcing standards of performance for new sources located in such State. If the Administrator finds that the procedure and the law of any State require the application and enforcement of standards of performance to at least the same extent as required by this section, such State is authorized to apply and enforce such standards of performance (except with respect to new sources owned or operated by the United States).

Protection from more stringent standards

(d) Notwithstanding any other provision of this chapter, any point source the construction of which is commenced after October 18, 1972, and which is so constructed

as to meet all applicable standards of performance shall not be subject to any more stringent standard of performance during a ten-year period beginning on the date of completion of such construction or during the period of depreciation or amortization of such facility for the purposes of section 167 or 169 (or both) of Title 26, whichever period ends first.

Illegality of operation of new sources in violation of applicable standards of performance

(e) After the effective date of standards of performance promulgated under this section, it shall be unlawful for any owner or operator of any new source to operate such source in violation of any standard of performance applicable to such source.

§ 1317. Toxic and pretreatment effluent standards; establishment; revision; illegality of source operation in violation of standards

(a) (1) The Administrator shall, within ninety days after October 18, 1972, publish (and from time to time thereafter revise) a list which includes any toxic pollutant or combination of such pollutants for which an effluent standard (which may include a prohibition of the discharge of such pollutants or combination of such pollutants) will be established under this section. The Administrator in publishing such list shall take into account the toxicity of the pollutant, its persistence, degradability, the usual or potential presence of the affected organisms in any waters, the importance of the affected organisms and the nature and extent of the effect of the toxic pollutant on such organisms.

(2) Within one hundred and eighty days after the date of publication of any list, or revision thereof, containing toxic pollutants or combination of pollutants under paragraph (1) of this subsection, the Administrator, in accordance with section 553 of Title 5, shall publish a proposed

effluent standard (or a prohibition) for such pollutant or combination of pollutants which shall take into account the toxicity of the pollutant, its persistence, degradability, the usual or potential presence of the affected organisms in any waters, the importance of the affected organisms and the nature and extent of the effect of the toxic pollutant on such organisms, and he shall publish a notice for a public hearing on such proposed standard to be held within thirty days. As soon as possible after such hearing, but not later than six months after publication of the proposed effluent standard (or prohibition), unless the Administrator finds, on the record, that a modification of such proposed standard (or prohibition) is justified based upon a preponderance of evidence adduced at such hearings, such standard (or prohibition) shall be promulgated.

(3) If after a public hearing the Administrator finds that a modification of such proposed standard (or prohibition) is justified, a revised effluent standard (or prohibition) for such pollutant or combination of pollutants shall be promulgated immediately. Such standard (or prohibition) shall be reviewed and, if appropriate, revised at least every three years.

(4) Any effluent standard promulgated under this section shall be at that level which the Administrator determines provides an ample margin of safety.

(5) When proposing or promulgating any effluent standard (or prohibition) under this section, the Administrator shall designated the category or categories of sources to which the effluent standard (or prohibition) shall apply. Any disposal of dredged material may be included in such a category of sources after consultation with the Secretary of the Army.

(6) Any effluent standard (or prohibition) established pursuant to this section shall take effect on such date or dates as specified in the order promulgating such standard, but in no case more than one year from the date of such promulgation.

(7) Prior to publishing any regulations pursuant to this section the Administrator shall, to the maximum extent practicable within the time provided, consult with appropriate advisory committees, States, independent experts, and Federal departments and agencies.

(b) (1) The Administrator shall, within one hundred and eighty days after October 18, 1972, and from time to time thereafter, publish proposed regulations establishing pretreatment standards for introduction of pollutants into treatment works (as defined in section 1292 of this title) which are publicly owned for those pollutants which are determined not to be susceptible to treatment by such treatment works or which would interfere with the operation of such treatment works. Not later than ninety days after such publication, and after opportunity for public hearing, the Administrator shall promulgate such pretreatment standards. Pretreatment standards under this subsection shall specify a time for compliance not to exceed three years from the date of promulgation and shall be established to prevent the discharge of any pollutant through treatment works (as defined in section 1292 of this title) which are publicly owned, which pollutant interferes with, passes through, or otherwise is incompatible with such works.

(2) The Administrator shall, from time to time, as control technology, processes, operating methods, or other alternatives change, revise such standards following the procedure established by this subsection for promulgation of such standards.

(3) When proposing or promulgating any pretreatment standard under this section, the Administrator shall designate the category or categories of sources to which such standard shall apply.

(4) Nothing in this subsection shall affect any pretreatment requirement established by any State or local law not in conflict with any pretreatment standard established under this subsection.

(c) In order to insure that any source introducing pollutants into a publicly owned treatment works, which source would be a new source subject to section 1316 of this title if it were to discharge pollutants, will not cause a violation of the effluent limitations established for any such treatment works, the Administrator shall promulgate pretreatment standards for the category of such sources simultaneously with the promulgation of standards of performance under section 1316 of this title for the equivalent category of new sources. Such pretreatment standards shall prevent the discharge of any pollutant into such treatment works, which pollutant may interfere with, pass through, or otherwise be incompatible with such works.

(d) After the effective date of any effluent standard or prohibition or pretreatment standard promulgated under this section, it shall be unlawful for any owner or operator of any source to operate any source in violation of any such effluent standard or prohibition or pretreatment standard.

§ 1319. Enforcement—State enforcement; compliance orders

(a) (1) Whenever, on the basis of any information available to him, the Administrator finds that any person is in violation of any condition or limitation which implements section 1311, 1312, 1316, 1317, or 1318 of this title in a permit issued by a State under an approved permit program under section 1342 of this title, he shall proceed under his authority in paragraph (3) of this subsection or he shall notify the person in alleged violation and such State of such finding. If beyond the thirtieth day after the Administrator's notification the State has not commenced appropriate enforcement action, the Administrator shall issue an order requiring such person to comply with such condition or limitation or shall bring a civil action in accordance with subsection (b) of this section.

(2) Whenever, on the basis of information available to him, the Administrator finds that violations of permit con-

ditions or limitations as set forth in paragraph (1) of this subsection are so widespread that such violations appear to result from a failure of the State to enforce such permit conditions or limitations effectively, he shall so notify the State. If the Administrator finds such failure extends beyond the thirtieth day after such notice, he shall give public notice of such finding. During the period beginning with such public notice and ending when such State satisfies the Administrator that it will enforce such conditions and limitations (hereafter referred to in this section as the period of "federally assumed enforcement"), the Administrator shall enforce any permit condition or limitation with respect to any person—

(A) by issuing an order to comply with such condition or limitation, or

(B) by bringing a civil action under subsection (b) of this section.

(3) Whenever on the basis of any information available to him the Administrator finds that any person is in violation of section 1311, 1312, 1316, 1317, or 1318 of this title, or is in violation of any permit condition or limitation implementing any of such sections in a permit issued under section 1342 of this title by him or by a State, he shall issue an order requiring such person to comply with such section or requirement, or he shall bring a civil action in accordance with subsection (b) of this section.

(4) A copy of any order issued under this subsection shall be sent immediately by the Administrator to the State in which the violation occurs and other affected States. Any order issued under this subsection shall be by personal service and shall state with reasonable specificity the nature of the violation, specify a time for compliance, not to exceed thirty days, which the Administrator determines is reasonable, taking into account the seriousness of the violation and any good faith efforts to comply with applicable requirements. In any case in which an order under this subsection (or notice to a violator under paragraph (1) of this subsection) is issued to a corporation, a copy of such

order (or notice) shall be served on any appropriate corporate officers. An order issued under this subsection relating to a violation of section 1318 of this title shall not take effect until the person to whom it is issued has had an opportunity to confer with the Administrator concerning the alleged violation.

Civil actions

(b) The Administrator is authorized to commence a civil action for appropriate relief, including a permanent or temporary injunction, for any violation for which he is authorized to issue a compliance order under subsection (a) of this section. Any action under this subsection may be brought in the district court of the United States for the district in which the defendant is located or resides or is doing business, and such court shall have jurisdiction to restrain such violation and to require compliance. Notice of the commencement of such action shall be given immediately to the appropriate State.

Criminal penalties

(c) (1) Any person who willfully or negligently violates section 1311, 1312, 1316, 1317, or 1318 of this title, or any permit condition or limitation implementing any of such sections in a permit issued under section 1342 of this title by the Administrator or by a State, shall be punished by a fine of not less than \$2,500 nor more than \$25,000 per day of violation, or by imprisonment for not more than one year, or by both. If the conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than \$50,000 per day of violation, or by imprisonment for not more than two years, or by both.

(2) Any person who knowingly makes any false statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under this chapter, or who falsifies, tam-

pers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this chapter, shall upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than six months, or by both.

(3) For the purposes of this subsection, the term "person" shall mean, in addition to the definition contained in section 1362(5) of this title, any responsible corporate officer.

Civil penalties

(d) Any person who violates section 1311, 1312, 1316, 1317, or 1318 of this title, or any permit condition or limitation implementing any of such sections in a permit issued under section 1342 of this title by the Administrator, or by a State, and any person who violates any order issued by the Administrator under subsection (a) of this section, shall be subject to a civil penalty not to exceed $10,000 per day of such violation.

State liability for judgments and expenses

(e) Whenever a municipality is a party to a civil action brought by the United States under this section, the State in which such municipality is located shall be joined as a party. Such State shall be liable for payment of any judgment, or any expenses incurred as a result of complying with any judgment, entered against the municipality in such action to the extent that the laws of that State prevent the municipality from raising revenues needed to comply with such judgment.

§ 1341. Certification—Compliance with applicable requirements; application; procedures; license suspension

(a) (1) Any applicant for a Federal license or permit to conduct any activity including, but not limited to, the con-

struction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates or will originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over the navigable waters at the point where the discharge originates or will originate, that any such discharge will comply with the applicable provisions of sections 1311, 1312, 1316, and 1317 of this title. In the case of any such activity for which there is not an applicable effluent limitation or other limitation under sections 1311(b) and 1312 of this title, and there is not an applicable standard under sections 1316 and 1317 of this title, the State shall so certify, except that any such certification shall not be deemed to satisfy section 1371(c) of this title. Such State or interstate agency shall establish procedures for public notice in the case of all applications for certification by it and, to the extent it deems appropriate, procedures for public hearings in connection with specific applications. In any case where a State or interstate agency has no authority to give such a certification, such certification shall be from the Administrator. If the State, interstate agency, or Administrator, as the case may be, fails or refuses to act on a request for certification, within a reasonable period of time (which shall not exceed one year) after receipt of such request, the certification requirements of this subsection shall be waived with respect to such Federal application. No license or permit shall be granted until the certification required by this section has been obtained or has been waived as provided in the preceding sentence. No license or permit shall be granted if certification has been denied by the State, interstate agency, or the Administrator, as the case may be.

(2) Upon receipt of such application and certification the licensing or permitting agency shall immediately notify the Administrator of such application and certification. Whenever such a discharge may affect, as determined by the Administrator, the quality of the waters of any other

State, the Administrator within thirty days of the date of notice of application for such Federal license or permit shall so notify such other State, the licensing or permitting agency, and the applicant. If, within sixty days after receipt of such notification, such other State determines that such discharge will affect the quality of its waters so as to violate any water quality requirement in such State, and within such sixty-day period notifies the Administrator and the licensing or permitting agency in writing of its objection to the issuance of such license or permit and requests a public hearing on such objection, the licensing or permitting agency shall hold such a hearing. The Administrator shall at such hearing submit his evaluation and recommendations with respect to any such objection to the licensing or permitting agency. Such agency, based upon the recommendations of such State, the Administrator, and upon any additional evidence, if any, presented to the agency at the hearing, shall condition such license or permit in such manner as may be necessary to insure compliance with applicable water quality requirements. If the imposition of conditions cannot insure such compliance such agency shall not issue such license or permit.

(3) The certification obtained pursuant to paragraph (1) of this subsection with respect to the construction of any facility shall fulfill the requirements of this subsection with respect to certification in connection with any other Federal license or permit required for the operation of such facility unless, after notice to the certifying State, agency, or Administrator, as the case may be, which shall be given by the Federal agency to whom application is made for such operating license or permit, the State, or if appropriate, the interstate agency or the Administrator, notifies such agency within sixty days after receipt of such notice that there is no longer reasonable assurance that there will be compliance with the applicable provisions of sections 1311, 1312, 1316, and 1317 of this title because of changes since the construction license or permit certification was issued in (A) the construction or operation of the facility,

(B) the characteristics of the waters into which such discharge is made, (C) the water quality criteria applicable to such waters or (D) applicable effluent limitations or other requirements. This paragraph shall be inapplicable in any case where the applicant for such operating license or permit has failed to provide the certifying State, or if appropriate, the interstate agency or the Administrator, with notice of any proposed changes in the construction or operation of the facility with respect to which a construction license or permit has been granted, which changes may result in violation of section 1311, 1312, 1316, or 1317 of this title.

(4) Prior to the initial operation of any federally licensed or permitted facility or activity which may result in any discharge into the navigable waters and with respect to which a certification has been obtained pursuant to paragraph (1) of this subsection, which facility or activity is not subject to a Federal operating license or permit, the licensee or permittee shall provide an opportunity for such certifying State, or, if appropriate, the interstate agency or the Administrator to review the manner in which the facility or activity shall be operated or conducted for the purposes of assuring that applicable effluent limitations or other limitations or other applicable water quality requirements will not be violated. Upon notification by the certifying State, or if appropriate, the interstate agency or the Administrator that the operation of any such federally licensed or permitted facility or activity will violate applicable effluent limitations or other limitations or other water quality requirements such Federal agency may, after public hearing, suspend such license or permit. If such license or permit is suspended, it shall remain suspended until notification is received from the certifying State, agency, or Administrator, as the case may be, that there is reasonable assurance that such facility or activity will not violate the applicable provisions of section 1311, 1312, 1316, or 1317 of this title.

(5) Any Federal license or permit with respect to which a certification has been obtained under paragraph (1) of this subsection may be suspended or revoked by the Federal agency issuing such license or permit upon the entering of a judgment under this chapter that such facility or activity has been operated in violation of the applicable provisions of section 1311, 1312, 1316, or 1317 of this title.

(6) No Federal agency shall be deemed to be an applicant for the purposes of this subsection.

(7) Except with respect to a permit issued under section 1342 of this title, in any case where actual construction of a facility has been lawfully commenced prior to April 3, 1970, no certification shall be required under this subsection for a license or permit issued after April 3, 1970, to operate such facility, except that any such license or permit issued without certification shall terminate April 3, 1973, unless prior to such termination date the person having such license or permit submits to the Federal agency which issued such license or permit a certification and otherwise meets the requirements of this section.

Compliance with other provisions of law setting applicable water quality requirements

(b) Nothing in this section shall be construed to limit the authority of any department or agency pursuant to any other provision of law to require compliance with any applicable water quality requirements. The Administrator shall, upon the request of any Federal department or agency, or State or interstate agency, or applicant, provide, for the purpose of this section, any relevant information on applicable effluent limitations, or other limitations, standards, regulations, or requirements, or water quality criteria, and shall, when requested by any such department or agency or State or interstate agency, or applicant, comment on any methods to comply with such limitations, standards, regulations, requirements, or criteria.

Authority of Secretary of the Army to permit use of spoil disposal areas by Federal licensees or permittees

(c) In order to implement the provisions of this section, the Secretary of the Army, acting through the Chief of Engineers, is authorized, if he deems it to be in the public interest, to permit the use of spoil disposal areas under his jurisdiction by Federal licensees or permittees, and to make an appropriate charge for such use. Moneys received from such licensees or permittees shall be deposited in the Treasury as miscellaneous receipts.

Limitations and monitoring requirements of certification

(d) Any certification provided under this section shall set forth any effluent limitations and other limitations, and monitoring requirements necessary to assure that any applicant for a Federal license or permit will comply with any applicable effluent limitations and other limitations, under section 1311 or 1312 of this title, standard of performance under section 1316 of this title, or prohibition, effluent standard, or pretreatment standard under section 1317 of this title, and with any other appropriate requirement of State law set forth in such certification, and shall become a condition on any Federal license or permit subject to the provisions of this section.

§ 1342. National pollutant discharge elimination system—Permits for discharge of pollutants

(a) (1) Except as provided in sections 1328 and 1344 of this title, the Administrator may, after opportunity for public hearing, issue a permit for the discharge of any pollutant, or combination of pollutants, notwithstanding section 1311(a) of this title, upon condition that such discharge will meet either all applicable requirements under sections 1311, 1312, 1316, 1317, 1318, and 1343 of this title, or prior to the taking of necessary implementing actions relating to all such requirements, such conditions as

the Administrator determines are necessary to carry out the provisions of this chapter.

(2) The Administrator shall prescribe conditions for such permits to assure compliance with the requirements of paragraph (1) of this subsection, including conditions on data and information collection, reporting, and such other requirements as he deems appropriate.

(3) The permit program of the Administrator under paragraph (1) of this subsection, and permits issued thereunder, shall be subject to the same terms, conditions, and requirements as apply to a State permit program and permits issued thereunder under subsection (b) of this section.

(4) All permits for discharges into the navigable waters issued pursuant to section 407 of this title, shall be deemed to be permits issued under this title, and permits issued under this title shall be deemed to be permits issued under section 407 of this title, and shall continue in force and effect for their term unless revoked, modified, or suspended in accordance with the provisions of this chapter.

(5) No permit for a discharge into the navigable waters shall be issued under section 407 of this title after October 18, 1972. Each application for a permit under section 407 of this title, pending on October 18, 1972, shall be deemed to be an application for a permit under this section. The Administrator shall authorize a State, which he determines has the capability of administering a permit program which will carry out the objective of this chapter, to issue permits for discharges into the navigable waters within the jurisdiction of such State. The Administrator may exercise the authority granted him by the preceding sentence only during the period which begins on October 18, 1972, and ends either on the ninetieth day after the date of the first promulgation of guidelines required by section 1314(h) (2) of this title, or the date of approval by the Administrator of a permit program for such State under subsection (b) of this section, whichever date first occurs, and no such authorization to a State shall extend

beyond the last day of such period. Each such permit shall be subject to such conditions as the Administrator determines are necessary to carry out the provisions of this chapter. No such permit shall issue if the Administrator objects to such issuance.

State permit programs

(b) At any time after the promulgation of the guidelines required by subsection (h) (2) of section 1314 of this title, the Governor of each State desiring to administer its own permit program for discharges into navigable waters within its jurisdiction may submit to the Administrator a full and complete description of the program it proposes to establish and administer under State law or under an interstate compact. In addition, such State shall submit a statement from the attorney general (or the attorney for those State water pollution control agencies which have independent legal counsel), or from the chief legal officer in the case of an interstate agency, that the laws of such State, or the interstate compact, as the case may be, provide adequate authority to carry out the described program. The Administrator shall approve each such submitted program unless he determines that adequate authority does not exist:

(1) To issue permits which—

(A) apply, and insure compliance with, any applicable requirements of sections 1311, 1312, 1316, 1317, and 1343 of this title;

(B) are for fixed terms not exceeding five years; and

(C) can be terminated or modified for cause including, but not limited to, the following:

(i) violation of any condition of the permit;

(ii) obtaining a permit of misrepresentation, or failure to disclose fully all relevant facts;

(iii) change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;

(D) control the disposal of pollutants into wells;

(2) (A) To issue permits which apply, and insure compliance with, all applicable requirements of section 1318 of this title, or

(B) To inspect, monitor, enter, and require reports to at least the same extent as required in section 1318 of this title;

(3) To insure that the public, and any other State the waters of which may be affected, receive notice of each application for a permit and to provide an opportunity for public hearing before a ruling on each such application;

(4) To insure that the Administrator receives notice of each application (including a copy thereof) for a permit;

(5) To insure that any State (other than the permitting State), whose waters may be affected by the issuance of a permit may submit written recommendations to the permitting State (and the Administrator) with respect to any permit application and, if any part of such written recommendations are not accepted by the permitting State, that the permitting State will notify such affected State (and the Administrator) in writing of its failure to so accept such recommendations together with its reasons for so doing;

(6) To insure that no permit will be issued if, in the judgment of the Secretary of the Army acting through the Chief of Engineers, after consultation with the Secretary of the department in which the Coast Guard is operating, anchorage and navigation of any of the navigable waters would be substantially impaired thereby;

(7) To abate violations of the permit or the permit program, including civil and criminal penalties and other ways and means of enforcement;

(8) To insure that any permit for a discharge from a publicly owned treatment works includes conditions to require adequate notice to the permitting agency of (A) new introductions into such works of pollutants from any source which would be a new source as defined in section 1316 of this title if such source were discharging pollutants, (B) new introductions of pollutants into such works from a source which would be subject to section 1311 of this title if it were discharging such pollutants, or (C) a substantial change in volume or character of pollutants being introduced into such works by a source introducing pollutants into such works at the time of issuance of the permit. Such notice shall include information on the quality and quantity of effluent to be introduced into such treatment works and any anticipated impact of such change in the quantity or quality of effluent to be discharged from such publicly owned treatment works; and

(9) To insure that any industrial user of any publicly owned treatment works will comply with sections 1284(b), 1317, and 1318 of this title.

Suspension of federal program upon submission of State program; withdrawal of approval of State program

(c) (1) Not later than ninety days after the date on which a State has submitted a program (or revision thereof) pursuant to subsection (b) of this section, the Administrator shall suspend the issuance of permits under subsection (a) of this section as to those navigable waters subject to such program unless he determines that the State permit program does not meet the requirements of subsection (b) of this section or does not conform to the guidelines issued under section 1314(h) (2) of this title. If the Administrator so determines, he shall notify the State of any revisions or modifications necessary to conform to such requirements or guidelines.

(2) Any State permit program under this section shall at all times be in accordance with this section and guide-

lines promulgated pursuant to section 1314(h) (2) of this title.

(3) Whenever the Administrator determines after public hearing that a State is not administering a program approved under this section in accordance with requirements of this section, he shall so notify the State and, if appropriate corrective action is not taken within a reasonable time, not to exceed ninety days, the Administrator shall withdraw approval of such program. The Administrator shall not withdraw approval of any such program unless he shall first have notified the State, and made public, in writing, the reasons for such withdrawal.

Notification of Administrator

(d) (1) Each State shall transmit to the Administrator a copy of each permit application received by such State and provide notice to the Administrator of every action related to the consideration of such permit application, including each permit proposed to be issued by such State.

(2) No permit shall issue (A) if the Administrator within ninety days of the date of his notification under subsection (b) (5) of this section objects in writing to the issuance of such permit, or (B) if the Administrator within ninety days of the date of transmittal of the proposed permit by the State objects in writing to the issuance of such permit as being outside the guidelines and requirements of this chapter.

(3) The Administrator may, as to any permit application, waive paragraph (2) of this subsection.

Waiver of notification requirement

(e) In accordance with guidelines promulgated pursuant to subsection (h) (2) of section 1314 of this title, the Administrator is authorized to waive the requirements of subsection (d) of this section at the time he approves a program pursuant to subsection (b) of this section for any

category (including any class, type, or size within such category) of point sources within the State submitting such program.

Point source categories

(f) The Administrator shall promulgate regulations establishing categories of point sources which he determines shall not be subject to the requirements of subsection (d) of this section in any State with a program approved pursuant to subsection (b) of this section. The Administrator may distinguish among classes, types, and sizes within any category of point sources.

Other regulations for safe transportation, handling, carriage, storage, and stowage of pollutants

(g) Any permit issued under this section for the discharge of pollutants into the navigable waters from a vessel or other floating craft shall be subject to any applicable regulations promulgated by the Secretary of the department in which the Coast Guard is operating, establishing specifications for safe transportation, handling, carriage, storage, and stowage of pollutants.

Violation of permit conditions; restriction or prohibition upon introduction of pollutant by source not previously utilizing treatment works

(h) In the event any condition of a permit for discharges from a treatment works (as defined in section 1292 of this title) which is publicly owned is violated, a State with a program approved under subsection (b) of this section or the Administrator, where no State program is approved, may proceed in a court of competent jurisdiction to restrict or prohibit the introduction of any pollutant into such treatment works by a source not utilizing such treatment works prior to the finding that such condition was violated.

Federal enforcement not limited

(i) Nothing in this section shall be construed to limit the authority of the Administrator to take action pursuant to section 1319 of this title.

Public information

(j) A copy of each permit application and each permit issued under this section shall be available to the public. Such permit application or permit, or portion thereof, shall further be available on request for the purposes of reproduction.

Compliance with permits

(k) Compliance with a permit issued pursuant to this section shall be deemed compliance, for purposes of sections 1319 and 1365 of this title, with sections 1311, 1312, 1316, 1317, and 1343 of this title, except any standard imposed under section 1317 of this title for a toxic pollutant injurious to human health. Until December 31, 1974, in any case where a permit for discharge has been applied for pursuant to this section, but final administrative disposition of such application has not been made, such discharge shall not be a violation of (1) section 1311, 1316, or 1342 of this title, or (2) section 407 of this title, unless the Administrator or other plaintiff proves that final administrative disposition of such application has not been made because of the failure of the applicant to furnish information reasonably required or requested in order to process the application. For the 180-day period beginning on October 18, 1972, in the case of any point source discharging any pollutant or combination of pollutants immediately prior to such date of enactment which source is not subject to section 407 of this title, the discharge by such source shall not be a violation of this chapter if such a source applies for a permit for discharge pursuant to this section within such 180-day period.

§ 1362. General Definitions

Except as otherwise specifically provided, when used in this Act:

(1) The term "State water pollution control agency" means the State agency designated by the Governor having responsibility for enforcing State laws relating to the abatement of pollution.

(2) The term "interstate agency" means an agency of two or more States established by or pursuant to an agreement or compact approved by the Congress, or any other agency of two or more States, having substantial powers or duties pertaining to the control of pollution as determined and approved by the Administrator.

(3) The term "State" means a State, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Trust Territory of the Pacific Islands.

(4) The term "municipality" means a city, town, borough, county, parish, district, association, or other public body created by or pursuant to State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of this Act.

(5) The term "person" means an individual, corporation, partnership, association, State, municipality, commission, or political subdivision of a State, or any interstate body.

(6) The term "pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. This term does not mean (A) "sewage from vessels" within the meaning of section 312 of this Act; or (B) water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil or gas production and disposed of in a well, if the well used

either to facilitate production or for disposal purposes is approved by authority of the State in which the well is located, and if such State determines that such injection or disposal will not result in the degradation of ground or surface water resources.

(7) The term "navigable waters" means the waters of the United States, including the territorial seas.

(8) The term "territorial seas" means the belt of the seas measured from the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters, and extending seaward a distance of three miles.

(9) The term "contiguous zone" means the entire zone established or to be established by the United States under article 24 of the Convention of the Territorial Sea and the Contiguous Zone.

(10) The term "ocean" means any portion of the high seas beyond the contiguous zone.

(11) The term "effluent limitation" means any restriction established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance.

(12) The term "discharge of a pollutant" and the term "discharge of pollutants" each means (A) any addition of any pollutant to navigable waters from any point source, (B) any addition of any pollutant to the waters of the contiguous zone or the ocean from any point source other than a vessel or other floating craft.

(13) The term "toxic pollutant" means those pollutants, or combinations of pollutants, including disease-causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will, on the basis of information available to the Administrator, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring.

(14) The term "point source" means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.

(15) The term "biological monitoring" shall mean the determination of the effects on aquatic life, including accumulation of pollutants in tissue, in receiving waters due to the discharge of pollutants (A) by techniques and procedures, including sampling of organisms representative of appropriate levels of the food chain appropriate to the volume and the physical, chemical, and biological characteristics of the effluent, and (B) at appropriate frequencies and locations.

(16) The term "discharge" when used without qualification includes a discharge of a pollutant, and a discharge of pollutants.

(17) The term "schedule of compliance" means a schedule of remedial measures including an enforceable sequence of actions or operations leading to compliance with an effluent limitation, other limitation, prohibition, or standard.

(18) The term "industrial user" means those industries identified in the Standard Industrial Classification Manual, Bureau of the Budget, 1967, as amended and supplemented, under the category "Division D—Manufacturing" and such other classes of significant waste producers as, by regulation, the Administrator deems appropriate.

(19) The term "pollution" means the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water.

§ 1365. Citizen suits—Authorization: jurisdiction

(a) Except as provided in subsection (b) of this section, any citizen may commence a civil action on his own behalf—

(1) against any person (including (i) the United States, and (ii) any other governmental instrumental-

ity or agency to the extent permitted by the eleventh amendment to the Constitution) who is alleged to be in violation of (A) an effluent standard or limitation under this chapter or (B) an order issued by the Administrator or a State with respect to such a standard or limitation, or

(2) against the Administrator where there is alleged a failure of the Administrator to perform any act or duty under this chapter which is not discretionary with the Administrator.

The district courts shall have jurisdiction, without regard to the amount in controversy or the citizenship of the parties, to enforce such an effluent standard or limitation, or such an order, or to order the Administrator to perform such act or duty, as the case may be, and to apply any appropriate civil penalties under section 1319(d) of this title.

Notice

(b) No action may be commenced—

(1) under subsection (a) (1) of this section—

(A) prior to sixty days after the plaintiff has given notice of the alleged violation (i) to the Administrator, (ii) to the State in which the alleged violation occurs, and (iii) to any alleged violator of the standard, limitation, or order, or

(B) if the Administrator or State has commenced and is diligently prosecuting a civil or criminal action in a court of the United States, or a State to require compliance with the standard, limitation, or order, but in any such action in a court of the United States any citizen may intervene as a matter of right.

(2) under subsection (a) (2) of this section prior to sixty days after the plaintiff has given notice of such action to the Administrator,

except that such action may be brought immediately after such notification in the case of an action under this section respecting a violation of sections 1316 and 1317(a) of this title. Notice under this subsection shall be given in such manner as the Administrator shall prescribe by regulation.

Venue; intervention by Administrator

(c) (1) Any action respecting a violation by a discharge source of an effluent standard or limitation or an order respecting such standard or limitation may be brought under this section only in the judicial district in which such source is located.

(2) In such action under this section, the Administrator, if not a party, may intervene as a matter of right.

Litigation costs

(d) The court, in issuing any final order in any action brought pursuant to this section, may award costs of litigation (including reasonable attorney and expert witness fees) to any party, whenever the court determines such award is appropriate. The court may, if a temporary restraining order or preliminary injunction is sought, require the filing of a bond or equivalent security in accordance with the Federal Rules of Civil Procedure.

Statutory or common law rights not restricted

(e) Nothing in this section shall restrict any right which any person (or class of persons) may have under any statute or common law to seek enforcement of any effluent standard or limitation or to seek any other relief (including relief against the Administrator or a State agency).

Effluent standard or limitation

(f) For purposes of this section, the term "effluent standard or limitation under this chapter" means (1) effective July 1, 1973, an unlawful act under subsection (a) of section 1311 of this title; (2) an effluent limitation or other limitation under section 1311 or 1312 of this title; (3) standard of performance under section 1316 of this title; (4) prohibition, effluent standard or pretreatment standards under section 1317 of this title; (5) certification under

section 1341 of this title; or (6) a permit or condition thereof issued under section 1342 of this title, which is in effect under this chapter (including a requirement applicable by reason of section 1323 of this title).

Citizen

(g) For the purposes of this section the term "citizen" means a person or persons having an interest which is or may be adversely affected.

Civil action by State Governors

(h) A Governor of a State may commence a civil action under subsection (a) of this section, without regard to the limitations of subsection (b) of this section, against the Administrator where there is alleged a failure of the Administrator to enforce an effluent standard or limitation under this chapter the violation of which is occurring in another State and is causing an adverse effect on the public health or welfare in his State, or is causing a violation of any water quality requirement in his State.

§ 1369. Administrative procedure and judicial review

(a) (1) For purposes of obtaining information under section 1315 of this title, or carrying out section 1367(e) of this title, the Administrator may issue subpenas for the attendance and testimony of witnesses and the production of relevant papers, books, and documents, and he may administer oaths. Except for effluent data, upon a showing satisfactory to the Administrator that such papers, books, documents, or information or particular part thereof, if made public, would divulge trade secrets or secret processes, the Administrator shall consider such record, report, or information or particular portion thereof confidential in accordance with the purposes of section 1905 of Title 18, except that such paper, book, document, or information may be disclosed to other officers, employees, or authorized representatives of the United States concerned with carrying out this chapter, or when relevant in any proceeding under this chapter. Witnesses summoned shall be paid the same fees and mileage that are paid witnesses in the courts of the United States. In case of contumacy or refusal to obey a subpena served upon any person under this subsection, the district court of the United States for any district in which such person is found or resides or transacts business, upon application by the United States and after notice to such person, shall have jurisdiction to issue an order requiring such person to appear and give testimony before the Administrator, to appear and produce papers, books, and documents before the Administrator, or both, and any failure to obey such order of the court may be punished by such court as a contempt thereof.

(2) The district courts of the United States are authorized, upon application by the Administrator, to issue subpenas for attendance and testimony of witnesses and the production of relevant papers, books, and documents, for purposes of obtaining information under sections 1314(b) and (c) of this title. Any papers, books, documents, or other information or part thereof, obtained by reason of such a subpena shall be subject to the same requirements as are provided in paragraph (1) of this subsection.

(b) (1) Review of the Administrator's action (A) in promulgating any standard of performance under section 1316 of this title, (B) in making any determination pursuant to section 1316(b) (1) (C) of this title, (C) in promulgating any effluent standard, prohibition, or pretreatment standard under section 1317 of this title, (D) in making any determination as to a State permit program submitted under section 1342(b) of this title, (E) in approving or promulgating any effluent limitation or other limitation under section 1311, 1312, or 1316 of this title, and (F) in issuing or denying any permit under section 1342 of this title, may be had by any interested person in the Circuit Court of Appeals of the United States for the Federal judicial district in which such person resides or

transacts such business upon application by such person. Any such application shall be made within ninety days from the date of such determination, approval, promulgation, issuance or denial, or after such date only if such application is based solely on grounds which arose after such ninetieth day.

(2) Action of the Administrator with respect to which review could have been obtained under paragraph (1) of this subsection shall not be subject to judicial review in any civil or criminal proceeding for enforcement.

(c) In any judicial proceeding brought under subsection (b) of this section in which review is sought of a determination under this chapter required to be made on the record after notice and opportunity for hearing, if any party applies to the court for leave to adduce additional evidence, and shows to the satisfaction of the court that such additional evidence is material and that there were reasonable grounds for the failure to adduce such evidence in the proceeding before the Administrator, the court may order such additional evidence (and evidence in rebuttal thereof) to be taken before the Administrator, in such manner and upon such terms and conditions as the court may deem proper. The Administrator may modify his findings as to the facts, or make new findings, by reason of the additional evidence so taken and he shall file such modified or new findings, and his recommendation, if any, for the modification or setting aside of his original determination, with the return of such additional evidence.

APPENDIX D

Regulations Involved

"EFFLUENT LIMITATIONS GUIDELINES" FOR THE INORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY

The rulemaking order promulgating the foregoing regulations is found at 39 *Fed. Reg.* 9611-9639 (March 12, 1974). The preamble of the order and the text of the regulations for several subcategories is as follows:

Title 40—Protection of Environment

CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

Subchapter N—Effluent Guidelines and Standards

PART 415—INORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY

On October 11, 1973 notice was published in the FEDERAL REGISTER, (38 FR 28174), that the Environmental Protection Agency (EPA or Agency) was proposing effluent limitations guidelines for existing sources and standards of performance and pretreatment standards for new sources within the aluminum chloride production subcategory, aluminum sulfate production subcategory, calcium carbide production subcategory, calcium chloride production subcategory, calcium oxide and hydroxide production subcategory, chlorine and sodium or potassium hydroxide production subcategory, hydrochloric acid production subcategory, hydrofluoric acid production subcategory, hydrogen peroxide production subcategory, nitric acid production subcategory, potassium metal production subcategory, potassium dichromate production subcategory, potassium sulfate production subcategory, sodium bicarbonate production subcategory, sodium carbonate production subcategory, sodium chloride production subcategory, sodium dichromate and sodium sulfate production subcategory, sodium metal production subcategory, sodium silicate pro-

duction subcategory, sodium sulfite production subcategory, sulfuric acid production subcategory, and titanium dioxide production subcategory of the inorganic chemicals manufacturing category of point sources.

The purpose of this notice is to establish final effluent limitations guidelines for existing sources and standards of performance and pretreatment standards for new sources in the inorganic chemicals manufacturing category of point sources, by amending 40 CFR Chapter I, Subchapter N, to add a new Part 415. This final rulemaking is promulgated pursuant to sections 301, 304(b) and (c), 306(b) and (c) and 307(c) of the Federal Water Pollution Control Act, as amended, (the Act); 33 U.S.C. 1251, 1311, 1314(b) and (c), 1316(b) and (c) and 1317(c); 86 Stat. 816 et seq.; Pub. L. 92-500. Regulations regarding cooling water intake structures for all categories of point sources under section 316(b) of the Act will be promulgated in 40 CFR Part 402.

In addition, the EPA is simultaneously proposing a separate provision which appears in the proposed rules section of the FEDERAL REGISTER, stating the application of the limitations and standards set forth below to users of publicly owned treatment works which are subject to pretreatment standards under section 307(b) of the Act. The basis of that proposed regulation is set forth in the associated notice of proposed rulemaking.

The legal basis, methodology and factual conclusions which support promulgation of this regulation were set forth in substantial detail in the notice of public review procedures published August 6, 1973 (38 FR 21202) and in the notice of proposed rulemaking for the aluminum chloride production subcategory, aluminum sulfate production subcategory, calcium carbide production subcategory, calcium chloride production subcategory, calcium oxide and hydroxide production subcategory, chlorine and sodium or potassium hydroxide production subcategory, hydrochloric acid production subcategory, hydrofluoric

acid production subcategory, hydrogen peroxide production subcategory, nitric acid production subcategory, potassium metal production subcategory, potassium dichromate production subcategory, potassium sulfate production subcategory, sodium bicarbonate production subcategory, sodium carbonate production subcategory, sodium chloride production subcategory, sodium dichromate and sodium sulfate production subcategory, sodium metal production subcategory, sodium silicate production subcategory, sodium sulfite production subcategory, sulfuric acid production subcategory, and titanium dioxide production subcategory. In addition, the regulations as proposed were supported by two other documents; (1) The document entitled "Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the major inorganic products Segment of the Inorganic Chemicals Manufacturing Point Source Category" (August 1973) and (2) the document entitled "Economic Analysis of Proposed Effluent Guidelines, Inorganic Chemicals, Alkali and Chlorine Industries (Major Products) (August, 1973). Both of these documents were made available to the public and circulated to interested persons at approximately the time of publication of the notice of proposed rulemaking.

Interested persons were invited to participate in the rulemaking by submitting written comments within 30 days from the date of publication. Prior public participation in the form of solicited comments and responses from the States, Federal agencies, and other interested parties were described in the preamble to the proposed regulation. The EPA has considered carefully all of the comments received and a discussion of these comments with the Agency's response thereto follows. The regulation as promulgated contains some significant departures from the proposed regulation. The following discussion outlines the reasons why these changes were made and why other suggested changes were not made.

Summary of Major Comments

The following responded to the request for written comments which was contained in the preamble to the proposed regulation: Airco Carbide, Allied Chemical Corporation, American Cyanamid Company, American Smelting & Refining Company, Atomic Energy Commission, BASF Wyandotte Corporation, B. F. Goodrich Chemical Company, California—State Water Resources Control Board, Chemetron Corporation, County Sanitation Districts of L.A. County, Detrex Chemical Industries, Diamond Shamrock Chemical Company, Dow Chemicals USA, E. I. DuPont de Nemours & Company, EPA Region VIII, Ferroallays Association, Georgia-Pacific Corporation, Great Salt Lake Minerals & Chemicals Corporation, Hooker-Industrial Chemical Division, Kaiser Aluminum & Chemical Corporation, Kerr-McGee Chemical Corporation, Leslie Salt Company, Lowry Associates, Manufacturing Chemists Association, Michigan Chemical Corporation, Midwest Carbide Corporation, Monsanto, National Paint & Coating Association, NL Industries, Titanium Pigments Operations, N.J. Zinc Company (Bethlehem, Pa.), N.J. Zinc Company (Gloucester, N.J.), Olin Chemicals, Pacific Carbide & Alloys Company, Pennwalt Corporation, Philadelphia Quartz Company, Pittsburgh Plate Glass Industries, Salt Institute, San Francisco Bay Conservation & Development Commission, SMC Glidden-Durkee, State of Michigan—Department of Natural Resources, State of N.Y. Department of Environmental Conservation, State of Utah—Attorney General, State of Utah—Department of Natural Resources, State of Utah—Department of Social Services. Stauffer Chemical Company, The Chlorine Institute, Inc., Texas Chemical; Union Carbide Corporation, U.S. Department of Commerce, U.S. Department of the Interior, Vulcan Materials Company, Water Pollution Control Federation and Western Salt Company. The following is a summary of the significant comments and the Agency's response to those comments.

(1) Because of wide variations in plant age and size, product mix, manufacturing processes, and raw materials,

the guidelines should be expressed as ranges. Many commenters recommended adoption of ESWQIAC's proposed methodology.

The approach taken in developing effluent limitations guidelines standards of performance for the inorganic chemicals manufacturing industry was to examine all variables and segment the industry into workable subcategories consistent with these variations. Twenty-two subcategories have been established based on the chemical product manufactured. In cases where two dissimilar processes are used to manufacture the same product, separate limitations have been established within the subcategory. Thus, ranges are provided for, as are other factors, by segmenting the inorganic chemicals manufacturing point source category into discrete subcategories, each with its own limitation. ESWQIAC's proposal is under evaluation as a contribution toward future refinements on guidelines for some industries. The committee has indicated that their proposed methodology could not be developed in sufficient time to be available for the current phase of guideline promulgation, which is proceeding according to a court-ordered schedule. Its present state of development does not provide sufficient evidence to warrant the Agency's delaying issuance of any standard in hopes that an alternative approach might be preferable.

(2) Many commenters stated that a guideline requiring "no discharge of process waste water pollutants" is ambiguous. Also, they stated that the definition of "pollutant" should clearly exclude innocuous dissolved solids, such as chlorides and sulfates.

The terms "process waste water", "process waste water pollutants", and "discharge of pollutant(s)" are clearly defined in 40 CFR Part 401. Reference to these definitions is included whenever these terms are used. "No" discharge of process waste water pollutants to navigable waters means that process waste water pollutants may not be discharged to navigable water in quantities greater than

the detectable limits using the test methods presented in 40 CFR 136 "Guidelines establishing test procedures for the analysis of pollutants" published in the FEDERAL REGISTER, October 16, 1973. The term "pollutant(s)" as defined in 40 CFR Part 401 includes all dissolved materials, such as chlorides and sulfate. Where a discharge of process waste water pollutants has been allowed for chemical subcategories, it was concluded that only the selected pollutant parameters could be economically limited by technology-based standards. In some cases, however, where total recycle, sale, recovery, or reuse of process waste water is technically and economically feasible, the discharge of all process waste water pollutants has been limited.

(3) Some comments stated that the proposed pretreatment standards preclude industrial use of public treatment works.

The methodology for applying effluent limitation guidelines to discharges from point sources to municipal treatment systems has been given further consideration by the Agency. The pollutants present in the waste water generated by the manufacture of inorganic chemicals have been identified. Discharge of these pollutants to municipal treatment systems is allowed in limited quantities so as to ensure adequate treatment and to prevent interference with the performance of such a system. These pretreatment standards for existing point sources are being proposed as an amendment to 40 CFR Part 415.

(4) Many commenters stated that the cost estimates were low and did not include costs for auxiliary equipment, land acquisitions, sludge disposal, or research and development work. Additionally, it was said that the impact of these costs has been understated.

Cost information was obtained directly from industry during plant visits, from engineering firms and equipment suppliers, and from available literature. This data has been obtained from the best sources available to the Agency

and is believed to be representative of actual capital and operating costs.

In cases where commenters have supplied additional cost data, satisfactorily documented and detailed, to indicate that the initial estimates are low, the figures have been revised and the proposed guidelines altered accordingly. Consideration has also been given to comments questioning the magnitude of the projected economic impact. Specific comments are summarized for the chemical subcategory to which they apply.

(5) Some commenters questioned the use of a factor of two to relate daily maximums to 30-day averages.

Extensive, long-term data is not available for each of the 22 chemical subcategories. It was necessary, therefore, to rely on data from other segments of the inorganic chemicals industry, as well as data from other industrial categories. Based on this information and using good engineering judgement on the performance reliability of recommended treatment systems, a factor of two appears generous.

(6) Many commenters said that limitations should be clearly defined as representing the net pollutant contributions as a result of the specific manufacturing process being limited. They question whether allowances should be made for pollutants present in the intake water.

If not otherwise specified, the effluent limitation numbers in this regulation will be applied as absolute discharge limitations. The use of such absolute limitations is generally appropriate since the concentration of a pollutant remaining after the application of a given treatment technology is relatively independent of minor variations in the pollutant concentration in the waste or the source of the pollutant. EPA intends to amend the NPDES regulations to take into account, when appropriate, pollutants already existing in the stream, so that in certain cases an effluent limitation may be adjusted to take into account pollutants

entering with a discharger's supply providing the water is withdrawn from the same source into which it is discharged. If the source is other than the receiving waterbody, the effluent standards will be applied as absolute limitations without adjustment.

(7) Aluminum chloride. Some commenters said that a market may not exist for the scrubber water (a 28 percent aluminum chloride solution) and that costs to purify and concentrate the solution may be prohibitive. They recommend a discharge allowance be made for the scrubber waste water effluent.

Only "yellow grade" aluminum chloride, made with an excess of chlorine, requires wet scrubbing techniques on the gaseous waste stream. Two plants, representing approximately 40 percent of the total annual production of aluminum chloride, currently are able to sell their dilute scrubber solution. A re-evaluation of the costs to concentrate the dilute scrubber solution indicates that costs for concentration are approximately 0.4 percent of the selling price of aluminum chloride.

(8) Aluminum sulfate. Some commenters stated that recycle of leaks and spills may contaminate high purity grades of product. Also, aluminum clays may be used as the raw material in place of bauxite which significantly effects the raw waste load. The commenters said that area for ponds may not be available at all locations. Also, net rainfall will preclude the use of ponds. When a dry product is produced, some commenters questioned whether recycling water increases the evaporative load on equipment, increasing energy requirements.

The wastes generated in refining bauxite to produce on iron-free hydrated alumina material are not considered to be process waste water pollutants resulting from the manufacture of iron-free aluminum sulfate. Process waste water pollutants generated by the refinement of bauxite ore are subject to the effluent guidelines to be promulgated in 40 CFR 421. If these wastes are segregated from leaks and

spills, contamination preventing recycle is not a problem. Other raw materials than bauxite, including clays and aluminum hydrate, generate greater quantities of raw waste because of impurities, but the waste water constituents are similar and the process is the same. Thus, although the use of different raw materials affects the raw waste load, it does not preclude the use of settling, clarification, and reuse of process waste water as recommended. The guidelines do not require plants to use large ponds to achieve no discharge of process waste water pollutants. Clarifiers may be used in locations where land is not available for funding. The costs for clarifiers are similar to the costs for ponding. A provision has been established to allow discharge from impoundments under some conditions of high rainfall.

(9) Calcium carbide. Calcium carbide manufacturers stated that it should be considered a ferroalloy because: (a) air standards consider it a ferroalloy; (b) all plants are members of Ferroalloy Assoc.; (c) it is usually made in complexes with ferroalloys; (d) it uses similar processes in similar ovens. Commentors also expressed concern that the only two plants achieving the proposed guidelines are unique, using an uncovered furnace. Other plants recover gaseous carbon monoxide and must scrub the gas to remove impurities. Because of high temperatures dry bag collection of dust is not feasible.

A portion of calcium carbide is produced in both the ferroalloy industry and the inorganic chemicals industry. The regulation presented herein is applicable to discharges from calcium carbide production in open furnaces. Plants employing this manufacturing process are not located in ferroalloy complexes. Effluent limitations for waste water discharges from calcium carbide production in covered furnaces will be established in a forthcoming regulation as part of the ferroalloy industry. This distinction will accommodate differences in process waste water from plants using open furnaces and those using covered furnaces.

(10) Calcium oxide and calcium hydroxide. Many commenters mentioned that costs for converting to a dry bag house from a wet scrubber system are economically unjustified. They also state that reuse of the water is not possible because of impurities.

The guidelines do not require conversion to a dry air pollution abatement system. An alternate treatment system consists of settling suspended solids and total recycle of the supernatant to the scrubbing system. At least one lime plant currently employs this treatment system to achieve the guidelines.

(11) Chlorine. Some commenters pointed out the fact that the proposed mercury limit for the mercury cell process is not achievable using the best practicable technology and that the location of mercury monitoring should be clearly specified as leaving the mercury treatment facility. They further state that no discharge of process waste water pollutants is not demonstrated in plants using either the diaphragm or mercury cell process and appears to be technically impossible. It should definitely not be required of new sources. Some commenters said that the lead limitation appears to be unachievable. They state that there is no rationale for having a more stringent TSS limitation on diaphragm cell plants than mercury cell plants.

While three plants are currently meeting the proposed guidelines, supplied data indicates that the proposed mercury limitation is not being achieved in certain plants employing the best practicable control technology currently available. The standard has been revised, considering the effluent reduction achieved by a greater number of plants. The limitation is intended to indicate mercury levels in the waste stream from the mercury treatment facility because mercury residuals may not be controllable. This is clearly stated in 40 CFR 415.61. The presence of lead in the effluent from diaphragm cell plants results from the development of cracks around protective resin seals which encase underlying lead mountings. Currently, one-third of the

industry is using anodes which do not require lead mountings. Industry representatives state that another one-third are seriously considering conversion. The lead limitation is the average value discharged from three plants which have not converted to lead-free anodes. The new sources performance standards of no discharge of process waste water pollutants is not presently demonstrated, and research and development may require several years. Therefore, new sources will be required to meet the best performance demonstrated in exemplary plants. The suspended solids limitation has been reevaluated for discharges from the diaphragm cell process.

(12) Many commenters stated that a provision should be established to allow for the discharge of leaks, spills, and washdown waste waters.

Spills, leaks, and washdown waste waters may be minimized or eliminated by good housekeeping, operation, and maintenance. The process waste water should be segregated from other waste streams and may be collected and fed back into the manufacturing process.

(13) Sulfuric acid. Some commenters stated that single adsorption plants can not eliminate their scrubber effluent, leaks and spills, or start-up and shut-down waste waters.

Good housekeeping, operation and equipment maintenance will minimize the volume of waste waters to a point where reuse or sale of the recovered acid product is feasible.

(14) Hydrogen peroxide—organic process. Some commenters said that total process waste water recycle is not possible because of organic impurities present in the waste streams.

The technology to achieve no discharge of process waste water pollutants is considered to be best available and best demonstrated technology. Organic solvents of the type used in the manufacturing process can be removed by skimming and carbon adsorption treatment. Best prac-

ticable technology consists of oil separation and clarification, treatments presently used in the industry to attain the required pollutant reductions.

(15) Potassium dichromate. Some commenters mentioned that replacement of barometric condensers with noncontact heat exchangers has not been demonstrated and should not be required by 1977. They also questioned whether reuse of sodium dichromate is possible in all plants.

Recycle of unreacted sodium dichromate is technically possible in all plants if segregation of waste streams and good housekeeping is practiced. Conversion to noncontact heat exchangers is being accomplished in the potassium dichromate industry. Noncontact heat exchangers are widely used and have been a proven technology in the chemical industry for many years.

(16) Sodium. Commenters stated that TSS removals to less than 50 mg/l have not been demonstrated in waste streams resulting from sodium manufacturing.

The technologies required to achieve the proposed TSS limitation are widely demonstrated. These alternatives include sedimentation, flocculation, and clarification. The suspended solids are primarily the decomposition products of the cells and alkaline salts.

(17) Sodium sulfite. Several comments stated that no discharge of process waste water pollutants is based upon recovery of sodium sulfate which is not possible because of a limited market. Also, wastes contain impurities other than sulfates. Returning these impurities to the process is not possible. Some commenters said that the COD limitation is confusing.

The COD limitation is in the units recommended in Standard Methods for Waste Water Analysis. The guidelines do not require the sale of sodium sulfate. Satisfactory land disposal of the unused sodium sulfate would cost approximately two percent of the selling price of sodium

sulfite. The waste waters may be segregated, treated and recycled to the process.

(18) Sodium carbonate. Some commenters stated that gravity sedimentation will not reduce the suspended solids concentration to the recommended 25 mg/l concentration. They say particles are very fine and a filter precoat is required. A small suspended solids reduction is not justified by the cost. Various manufacturers recommend using a suspended solids concentration of 50 mg/l as it is compatible with actual settling pond performance and is a more "realistic and achievable level".

The treatment technologies required to attain the affluent pollutant reduction proposed are conventional and proven treatment systems. Treatment alternatives include sedimentation basins, flocculators and clarifiers.

(19) Sodium dichromate. Some commenters mentioned that technology has not been demonstrated to achieve no discharge of process waste water pollutants and that it is technically impossible. The 1977 standard is based on a plant which is only two years old. Commentors question whether existing plants can economically achieve its effluent quality.

The control technology used at the exemplary plant consists of leak and spill containment and pickle liquor treatment for chromium reduction followed by sedimentation to achieve the proposed guidelines. Another plant uses conventional sodium hydrosulfide treatment and lime to attain the proposed chromium levels. The proposed effluent limitations can be attained in existing facilities. The proposed new source performance standards were based on evaporation to attain no discharge of process waste water pollutants. Considering nonwater environmental aspects, the new source performance standards have been revised to require good water conservation and best practicable technology.

(20) Sodium chloride. Commentors stated that most plants return unused bitterns to the source. They feel that

discharges do not threaten aquatic life or contribute to water pollution and that recovery of potassium and magnesium salts is not economical.

Although some plants may have ample land to store waste bitterns, this treatment is not universally applicable. Alternative means to achieve no discharge of process waste water pollutants are economically prohibitive. If no pollutants are added to the waste bitterns, return of the unused salts to the source is a reasonable limitation for technology-based standards.

(21) Sodium Silicate. Some comments stated that sodium hydroxide, sodium sulfate, and silica should not be considered pollutants. Because of their natural occurrence in most waters, costs to achieve no discharge of these compounds are not justified. They further state that recycle is not possible because of turbidity problems and evaporation ponds are not universally applicable.

A reexamination of initial data and consideration of substantial comments indicate that cost of treatment to achieve no discharge of process waste water pollutants may not be justified for a 1977 standard. Best practicable technology has been redefined as a well-designed and operated settling basin.

(22) Titanium dioxide. Several commenters stated that the costs to achieve the proposed limitations place a greater financial burden on titanium dioxide producers using the sulfate process than those using the chloride process. They say that this economic inequity may force some sulfate process plants to close down because of their inability to recover treatment costs while maintaining competitive prices. It was stated that polishing filtration is necessary to achieve the suspended solids limitations for discharges from the sulfate process. The commenters said that some of the pollutant parameters selected as the subject of effluent guidelines should be eliminated. Industry further stated that the flow basis of 100,000 1/kkg for the sulfate process is not achievable. Several commenters question

the use of "dissolved iron" as the means to limit iron. They feel "total iron" should be used so as to include the total quantities of iron being discharged regardless of its state.

(i) Chloride Process. A re-evaluation of the pollutant parameters selected indicates that effluent standards for metals other than iron are not necessary requirements to establish compliance with best practicable technology currently available. While monitoring aluminum, lead, etc., provides for stricter effluent control, these metals are present only in small quantities relative to the iron content. They are removed to acceptable levels if the iron limitation is maintained. The guidelines represent the quantities of pollutants which may be discharged based on treatment technology. The recommended treatment includes iron precipitation and clarification. The efficiency of this treatment may be best determined by measuring the total iron content of the effluent. Data from this type of treatment indicates that a effluent containing 4 mg/1 total iron can be achieved.

(ii) Sulfate process. Inclusion of effluent limitations for suspended solids, pH, and iron are sufficient to ensure compliance with the effluent reduction attainable through the application of the required levels of treatment technology. Other waste water constituents appear in relatively minor quantities and are adequately removed when the iron limitation is achieved. The rationale presented above for using the parameter "total iron" is applicable to the sulfate process also. The process waste water flow basis of 100,000 1/kkg has been re-examined. Based on initial data and comments received this basis has been revised. A total process waste water flow of 210,000 1/kkg of product is achievable using recycle of scrubber water. Detailed data have been supplied subsequent to the publication of the proposed regulations. These data indicate the costs to reduce the TSS concentration to 25 mg/1 are greater than initially estimated. Considering the nature of the solids and the expected performance from the recommended

treatment system a concentration basis of 50 mg/1 is reasonable for a 1977 standard.

(23) Some commenters said that provisions should be established to allow for discharges from treatment or holding ponds in the event of catastrophic rain storms.

For chemicals subcategories which have a limitation of no discharge of process waste water pollutants to navigable waters and for which ponds may be part of the treatment system, an allowance has been provided to permit a discharge of process waste water from a plant located in an area where rainfall exceeds the evaporation rate or in the event of a catastrophic rainfall.

Revision of the Proposed Regulation Prior to Promulgation

As a result of public comment and continuing review and evaluation of the proposed regulation by EPA, the following changes have been made in the regulation.

(1) The applicability of the proposed regulations for calcium carbide production has been amended to include only calcium carbide production in uncovered furnaces.

(2) The effluent limitation guidelines for sodium chloride production have been amended to allow for the return of unused salt wastes to the body of water from which the brine solution was initially obtained. No additional pollutants may be added to the waste salt solution prior to discharge.

(3) The effluent limitation for sodium silicate production based on the application of best practicable technology currently available has been revised to permit a discharge of small quantities of suspended solids.

(4) The new source performance standards for the sodium dichromate production subcategory and the sodium sulfite production subcategory have been revised to require good water conservation and implementation of the best practicable technology currently available.

(5) The new source performance standards for chlorine production have also been amended to allow for a waste water discharge from both diaphragm and mercury cell plants.

(6) The mercury limitation has been revised for mercury cell chlorine plants based on the effluent reduction attainable by the best practicable technology currently available.

(7) The effluent limitation of suspended solids has been revised for diaphragm cell chlorine plants.

(8) The effluent limitations for titanium dioxide production have been changed to exclude limitations on trace elements. The parameter "total dissolved iron" has been amended to "total iron" and the guideline has been altered accordingly.

(9) The effluent limitations for titanium dioxide production by the sulfate process have been changed. The flow basis has been increased resulting in less stringent limitations on iron and suspended solids.

(10) Minor adjustments have been made to reflect the fact that an increased number of definitions and analytical methods have been included in 40 CFR 401 and are incorporated by reference where applicable.

(11) Section 304(b)(1)(B) of the Act provides for "guidelines" to implement the uniform national standards of section 301(b)(1)(A). Thus Congress recognized that some flexibility was necessary in order to take into account the complexity of the industrial world with respect to the practicability of pollution control technology. In conformity with the Congressional intent and in recognition of the possible failure of these regulations to account for all factors bearing on the practicability of control technology, it was concluded that some provision was needed to authorize flexibility in the strict application of the limitations contained in the regulation where required by special circumstances applicable to individual dischargers. Accord-

ingly, a provision allowing flexibility in the application of the limitations representing best practicable control technology currently available has been added to each subpart, to account for special circumstances that may not have been adequately accounted for when these regulations were developed.

(12) An allowance has been provided to permit the discharge of process waste water pollutants from plants located in areas where precipitation exceeds evaporation. An allowance has also been provided for discharge in the event of a catastrophic rainfall. These allowances are applicable only to chemical subcategories which may utilize ponds to achieve no discharge of process waste water pollutants.

Economic Impact

The changes that were made to the proposed regulations for the inorganic chemicals manufacturing category do not substantially affect the initial economic analysis. The changes detailed above concern new sources and reflect a re-evaluation of the efficiency of various treatment systems. These revisions, however, do not affect the conclusions of the economic impact study.

Cost-Benefit Analysis

The detrimental effects of the constituents of waste waters now discharged by point sources within the major inorganic products segment of the inorganic chemicals manufacturing point source category are discussed in Section VI of the report entitled "Development Document for Effluent Limitations Guidelines for the major inorganic products segment of the Inorganic Chemicals Manufacturing Point Source Category" (August 1974). It is not feasible to quantify in economic terms, particularly on a national basis, the costs resulting from the discharge of these pollutants to our Nation's waterways. Nevertheless, as indicated in Section VI, the pollutants discharged have

substantial and damaging impacts on the quality of water and therefore on its capacity to support healthy populations of wildlife, fish and other aquatic wildlife and on its suitability for industrial, recreational and drinking water supply uses.

The total cost of implementing the effluent limitations guidelines includes the direct capital and operating costs of the pollution control technology employed to achieve compliance and the indirect economic and environmental costs identified in Section VIII and in the supplementary report entitled "Economic Analysis of Proposed Effluent Guidelines Inorganic Chemicals, Alkali and Chlorine Industries (Major Products)" (August 1973). Implementing the effluent limitations guidelines will substantially reduce the environmental harm which would otherwise be attributable to the continued discharge of polluted waste waters from existing and newly constructed plants in the inorganic chemicals manufacturing industry. The Agency believes that the benefits of thus reducing the pollutants discharged justify the associated costs which, though substantial in absolute terms, represent a relatively small percentage of the total capital investment in the industry.

Publication of Information on Processes, Procedures, or Operating Methods Which Result in the Elimination or Reduction of the Discharge of Pollutants

In conformance with the requirements of Section 304 (c), a manual entitled, "Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the MAJOR INORGANIC PRODUCTS Segment of the Inorganic Chemicals Manufacturing Point Source Category," has been published and is available for purchase from the Government Printing Office, Washington, D. C. 20401 for a nominal fee.

Final Rulemaking

In consideration of the foregoing, 40 CFR Chapter I, Subchapter N is hereby amended by adding a new Part 415, Inorganic Chemicals Manufacturing Point Source Category, to read as set forth below. This final regulation is promulgated as set forth below and shall be effective on May 13, 1974.

Dated: March 4, 1974.

JOHN QUARLES,
Acting Administrator.

Subpart A—Aluminum Chloride Production Subcategory

Sec.
415.10 Applicability; description of the aluminum chloride production subcategory.
415.11 Specialized definitions.
415.12 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.
415.13 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.
415.14 [Reserved]
415.15 Standards of performance for new sources.
415.16 Pretreatment standards for new sources.

Subpart B—Aluminum Sulfate Production Subcategory

415.20 Applicability; description of the aluminum sulfate production subcategory.
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AUTHORITY: Secs. 301, 304(b) and (c), 306(b) and (c), 307(c), Pub. L. 92-500; 86 Stat. 816 et seq.; (33 U.S.C. 1251, 1311, 1314(b) and (c), 1316(b) and (c), 1317(c)).

* * * * * *

SUBPART S—SODIUM SILICATE PRODUCTION SUBCATEGORY

§ 415.190 Applicability; description of the sodium silicate production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of sodium silicate.

§ 415.191 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR 401 shall apply to this subpart.

(b) The term "product" shall mean sodium silicate.

§ 415.192 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines.

On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed
	Metric units (kilograms per 1,000 kg of product)	
TSS	0.01	0.005
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	0.01	0.005
pH	Within the range 6.0 to 9.0.	

§ 415.193 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

(a) Subject to the provisions of paragraph (b) of this section there shall be no discharge of process waste water pollutants into navigable waters.

(b) A process waste water impoundment which is designed, constructed, and operated so as to contain the precipitation from the 25 years, 24 hour rainfall event as established by the National Climatic Center, National Oceanic and Atmospheric Administration for the area in which such impoundment is located may discharge that volume of process waste water which is equivalent to the volume of precipitation that falls within the impoundment in excess of that attributable to the 25 year, 24 hour rainfall event, when such event occurs.

§ 415.194 [Reserved]

§ 415.195 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart:

(a) Subject to the provisions of paragraph (b) of this section there shall be no discharge of process waste water pollutants into navigable waters.

(b) A process waste water impoundment which is designed, constructed, and operated so as to contain the precipitation from the 25 year, 24 hour rainfall event as established by the National Climatic Center, National

Oceanic and Atmospheric Administration for the area in which such impoundment is located may discharge that volume of process waste water which is equivalent to the volume of precipitation that falls within the impoundment in excess of that attributable to the 25 year, 24 hour rainfall event, when such event occurs.

§ 415.196 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the sodium silicate production subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the navigable waters), shall be the standard set forth in Part 128 of this Chapter, except that, for the purpose of this section, § 128.133 of this chapter shall be amended to read as follows:

> In addition to the prohibitions set forth in 40 CFR 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 415.195; *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

* * * * * *

SUBPART U—SULFURIC ACID PRODUCTION SUBCATEGORY

§ 415.210 Applicability; description of the sulfuric acid production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of sulfuric acid in single and double adsorption plants. The provisions are

not applicable to discharges from plants recovering waste sulfuric acid.

§ 415.211 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR 401 shall apply to this subpart.

§ 415.212 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional

Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.213 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.214 [Reserved]

§ 415.215 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.216 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the sulfuric acid production subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the navigable waters), shall be the standard set forth in Part 128 of this Chapter, except that, for the purpose of this section, § 128.133 of this Chapter shall be amended to read as follows:

> In addition to the prohibitions set forth in 40 CFR 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 415.215; *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

* * * * * *

APPENDIX

In the Supreme Court of the United States

October Term, 1976

No. 75-978

E. I. du Pont de Nemours and Company, *et al.*,
Petitioners

v.

Russell E. Train, as Administrator,
Environmental Protection Agency, *et al.*,
Respondents.

On Writ Of Certiorari To The United States Court Of Appeals For The Fourth Circuit

Petition for Certiorari Filed January 12, 1976
Certiorari Granted April 19, 1976

In the Supreme Court of the United States

October Term, 1976

No. 75-978

E. I. du Pont de Nemours and Company, *et al.*,
Petitioners

v.

Russell E. Train, as Administrator,
Environmental Protection Agency, *et al.*,
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Administrative Proceedings in the Environmental Protection Agency

*Bracketed page numbers refer to the Administrative Record as paginated by EPA.

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IN THE UNITED STATES DISTRICT COURT FOR THE WESTERN DISTRICT OF VIRGINIA

Civ. A. No. 74-57

4/1/74 Complaint filed.

5/13/74 Plaintiffs' motion for separation of and expeditious determination of basic issues of statutory construction and for summary judgment, or, in the alternative, declaratory judgment on such issues.

5/28/74 Defendants' motion to dismiss, or, in the alternative, to stay the proceedings.

9/27/74 Opinion and order.

10/8/74 Plaintiffs' notice of appeal.

IN THE UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

No. 74-2237 (Civil)

11/8/74 Appeal docketed.

11/12/74 Joint stipulation and motion for consolidation with Nos. 74-1261, *etc*.

11/19/74 Order consolidating this case with Nos. 74-1261, *etc*.

12/10/74 Joint motion for consolidated oral argument in No. 74-2237 and Nos. 74-1261, *etc*.

2/4/75 Joint motion for expedited oral argument.

4/22/75 Argument.

5/5/75 Motion of Appalachian Power Co., *et al.*, to defer decision on the merits.

5/20/75 Order denying motion.

6/11/75 Appellees' motion to file supplemental memorandum.

6/17/75 Motion granted.

6/17/75 Appellants' motion to file appellants' supplemental brief in response to appellees' supplemental memorandum.

12/30/75 Opinion and order.

IN THE UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

Nos. 74-1261, 74-1290, 74-1296-1304,
74-1357, 74-1406-07, 74-1588-90, 74-1670-1, 74-1741 (Civil)

3/5/74 First petition for review.

6/7/74 Order establishing schedule for briefs.

6/27/74 Order consolidating cases into two groups, one pertaining to effluent guidelines and one pertaining to standards of performance for new sources.

7/12/74 Petitioner's motion for remand of effluent guidelines for the hydrofluoric acid subcategory.

7/17/74 Petitioner's motion for remand of standards of performance of new sources for the hydrofluoric acid subcategory.

7/31/74 Stipulation by parties.

8/6/74 Order denying petitioner's motion to remand effluent guidelines.

8/12/74 Order denying petitioner's motion to remand standards of performance.

8/16/74 Order withdrawing order denying remand.

8/27/74 Motion of National Resources Defense Council (NRDC) to file a brief amicus curiae.

8/27/74 Motion granted.

9/9/74 Motion of Chamber of Commerce of the United States to file a brief amicus curiae.

9/9/74 Motion granted.

9/13/74 Motion of Allegheny Power System, Inc., to file a brief amicus curiae.

9/30/74 Motion granted.

9/30/74 Motion of N. J. Zinc Co. to file a reply brief amicus curiae.

10/7/74 Motion granted.

10/29/74 Motion of RMI Co. to file a brief amicus curiae and to participate in oral argument.

11/15/74 Motion of RMI Co. granted as to brief amicus curiae and denied as to participation in oral argument.

12/19/74 Joint motion for consolidated oral argument.

1/29/75 Motion of American Petroleum Institute and Eleven Member Companies to file a brief amicus curiae.

2/4/75 Motion of American Petroleum Institute, *et al.*, granted.

2/4/75 Joint motion for expedited oral argument.

3/28/75 Motion of amicus curiae Allegheny Power Systems, Inc., to file a supplemental brief.

4/4/75 Motion of Allegheny Power Systems, Inc., granted.

4/10/75 Motion of amicus curiae American Petroleum Institute, *et al.*, to file a supplemental memorandum.

4/11/75 Motion granted.

4/11/75 Respondent's motion to file supplemental memorandum.

4/14/75 Motion granted.

4/14/75 Motion of American Petroleum Institute, *et al.*, to participate in oral argument.

4/22/75 Argument.

5/5/75 Motion of Appalachian Power Co., *et al.*, to defer decision on the merits.

11/10/75 Motion of petitioner N. L. Industries, Inc., to stay challenged effluent guidelines pending decision.

11/21/75 Motion by amicus curiae American Petroleum Institute to file supplemental memorandum.

12/22/75 Motion of American Petroleum Institute denied.

3/10/76 Opinion and Order.

In the Supreme Court of the United States

October Term, 1976

No. 75-978

E. I. du Pont de Nemours and Company, *et al.*, *Petitioners*,

v.

Russell E. Train, as Administrator, Environmental Protection Agency, *et al.*, *Respondents*.

Administrative Proceedings in the Environmental Protection Agency

[1] **DRAFT**

DEVELOPMENT DOCUMENT FOR EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS OF PERFORMANCE

INORGANIC CHEMICALS, ALKALI AND CHLORINE INDUSTRIES

Prepared by General Technologies Corporation for United States Environmental Protection Agency Under Contract Number 68-01-1513

JUNE 1973

[2] **NOTICE**

The attached document is a DRAFT CONTRACTOR'S REPORT. It includes technical information and recommendations submitted by the Contractor to the United States Environmental Protection Agency ("EPA") regarding the subject industry. It is being distributed for review and comment only. The report is not an official EPA publication and it has not been reviewed by the Agency.

The report, including the recommendations, will be undergoing extensive review by EPA, Federal and State agencies, public interest organizations and other interested groups and persons during the coming weeks. The report and in particular the contractor's recommended effluent limitations guidelines and standards of performance is subject to change in any and all respects.

The regulations to be published by EPA under Sections 304(b) and 306 of the Federal Water Pollution Control Act, as amended, will be based to a large extent on the report and the comments received on it. However, pursuant to Sections 304(b) and 306 of the Act, EPA will also consider additional pertinent technical and economic information which is developed in the course of review of this report by the public and within EPA. EPA is currently performing an economic impact analysis regarding the subject industry, which will be taken into account as part of the review of the report. Upon completion of the review process, and prior to final promulgation of regulations, an EPA report will be issued setting forth EPA's conclusions concerning the subject industry, effluent limitations guidelines and standards of performance applicable to such industry. Judgements necessary to promulgation of regulations under Sections 304(b) and 306 of the Act, of course, remain the responsibility of EPA. Subject to these limitations, EPA is making this draft contractor's report available in order to encourage the widest possible participation of interested persons in the decision making process at the earliest possible time.

The report shall have standing in any EPA proceeding or court proceeding only to the extent that it represents the views of the Contractor who studied the subject industry and prepared the information and recommendations. It cannot be cited, referenced, or represented in any respect in any such proceedings as a statement of EPA's views regarding the subject industry.

U.S. Environmental Protection Agency
Office of Air and Water Programs
Effluent Guidelines Division
Washington, D. C. 20460

* * * *

[4] ABSTRACT

This document presents the findings of an extensive study of the inorganic chemicals, chlor-alkali industry by the General Technologies Corporation for the Environmental Protection Agency for the purpose of developing effluent limitations guidelines, Federal standards of performance, and pretreatment standards for the industry, to implement Sections 304, 306 and 307 of the "Act".

Effluent limitations guidelines contained herein set forth the degree of effluent reduction attainable through the application of the best practicable control technology currently available and the degree of effluent reduction attainable through the application of the best available technology economically achievable which must be achieved by existing point sources by July 1, 1977 and July 1, 1983 respectively. The Standards of Performance for new sources and pretreatment standards contained herein set forth the degree of effluent reduction which is achievable through the application of the best available demonstrated control technology, processes, operating methods, or other alternatives.

Based on the use of Level I (BPCTCA) technology, the best practicable currently available treatment, 14 of the 25 chemicals under study can be manufactured with zero discharge of process waste water. With the use of Level II (BACTEA) technology, the best economically achievable, all of the 25 chemicals can be manufactured with zero discharge of process waste water. Zero discharge of process waste water is also achievable as a new source performance standard.

Supportive data and rationale for development of the proposed effluent limitations guidelines and standards of performance are contained in this report.

NOTICE: THESE ARE TENTATIVE RECOMMENDATIONS BASED UPON INFORMATION IN THIS REPORT AND ARE SUBJECT TO CHANGE BASED UPON COMMENTS RECEIVED AN DFURTHER INTERNAL REVIEW BY EPA.

[5] CONTENTS

[6]

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[2550] October 30, 1972

EFFLUENT LIMITATION GUIDANCE FOR THE REFUSE ACT PERMIT PROGRAM INORGANIC CHEMICALS INDUSTRY

Copied by MCA

[2551] **GENERAL**

This guidance for the establishment of effluent limitations for discharges in the Inorganic Chemicals Industry category sets forth numerical limitations based on the application of best practicable control technology currently available. Schedule A values reflect the Agency's best technical judgment of the effluent levels which can be achieved by the application of the highest level of control technology which is now considered 'practicable' and 'currently available' for the industry. Schedule A values are based on experience with the technology, including demonstration projects, pilot plants, and actual use, which demonstrates that it is reliably achievable.

In every case of (i) new plants installing pollution abatement equipment and (ii) existing plants now beginning abatement programs, you should apply Schedule A values. In some cases, economic and social factors may affect the practicability of applying control techniques to achieve these values, and may require some modification of Schedule A values as to particular plants. These instances should be kept to an absolute minimum. Guidance on the economic and social factors which may require that you consider such modifications, as well as more detailed explanation of the engineering assumptions underlying the

Schedule A values, will be provided at technical seminars to be conducted concerning each industrial category.

[2552] Schedule B values represent the most lenient acceptable effluent levels. No plant should achieve less pollution reduction than Schedule B values. Schedule B values may be applied where a discharge has, at the time the permit is issued, commenced and made substantial progress on an abatement program that will be completed within 24 months or less from the time the discharge permit is issued. If the plant also has extensive ongoing pollution abatement programs in other areas such as air pollution the Regional Administrator may modify this 24-month period.

If effluent limits based on 'best practicable control technology' fail to meet water quality standards, then such limits will be upgraded to comply with water quality standards and EPA policy.

INDUSTRIAL CATEGORY DESCRIPTION

Inorganic Chemicals, Alkalies and Chlorine are covered in the Standard Industrial Classification (SIC) 2812, 2816, and 2819. Inorganic compounds such as anhydrous ammonia, superphosphates and urea are not covered in this category since they are included in the Fertilizers Industry category. The following products were selected for Guidelines based on information and data available.

Aluminum Chloride
Aluminum Sulfate
Chlorine-Sodium Hydroxide
Hydrochloric Acid
[2553]
Hydrofluoric Acid
Hydrogen Peroxide
Lime
Nitric Acid
Elemental Phosphorus
Sulfuric Acid

RATIONALE

General

The effluent guidelines for the inorganic chemical industry were developed from information in the Industrial Waste Study of Inorganic Chemicals, Alkalies and Chlorine by General Technologies Corporation; from information resulting from a survey of 76 inorganic chemicals plants by the Manufacturing Chemists Association (MCA); from Corps of Engineers permit data and from use of engineering judgment.

The industries in these categories manufacture products from raw materials that are inorganic in nature, thereby resulting in wastewater containing a low biochemical oxygen demand, inert solids, large amounts of dissolved solids, and effluents with a wide range of pH values. The major pollutant common to nearly all of the industry is inorganic suspended solids, a parameter that can be controlled with sedimentation basins designed for minimal short circuiting and sufficient detention time.

[2554] Total dissolved solids, chiefly chlorides and sulfates, constitute the second major class of pollutants for the inorganic industry. However, it should be noted that guidelines are not presently placed on dissolved solids, chlorides, and sulfates. When the discharge of any of these parameters may be in violation of Federal or State or local water quality standards, limits will be established. When such is the case a substantial amount of dissolved solids reduction can be effected through in-plant controls some of which are:

(1) Chlorine-caustic

(a) non-contact vapor condensers.

(b) use of indirect chlorine coolers in the chlorine compression process

(c) collection and reuse of drying acid.

(d) recycling of sodium chloride from the evaporators concentrating caustic soda

(e) use of indirect vapor condensers in the brine dechlorination process

(f) recycle of brine filter backwashwater

(g) collection and reuse of effluent from waste chlorine gas disposal system

(h) maximum removal of brine solution from slurries resulting in precipitation of impurities from raw brine solutions

[2555] (i) containment and recycling of spills and leaks back to the process.

(2) Nitric Acid

(a) replacement of barometric quench condensers with non-contact condensers

(b) the use of single and double mechanical pump seals

(c) curbing the proces area with recycling of spills.

(3) Hydrochloric Acid

(a) curbing and floor sumps to collect and recycle strong acid spills and leaks

(b) maximize the efficiency of the cooler and absorber to minimize the chloride wasteload from the scrubber.

(4) Hydrogen Peroxide (organic method)—separation of organic solvents from the aqueous media with decanters or API separators for recycle or recovery.

(5) Hydrofluoric Acid—maximize for efficiency of the acid absorbers to minimize the fluoride wasteload from ejector scrubber systems.

(6) Sulfuric Acid—curbing and floor sumps to collect and recycle spills and leaks.

TREATMENT MODELS

Treatment models representing "Best Practicable Treatment" are described for each of the product industries. They are not intended to specify procedures [2556] or processes, but to illustrate and demonstrate the means by which "A" levels may

be achieved. Alternative abatement techniques which will achieve the same end are encouraged.

Aluminum Chloride—	sedimentation and coagulation.
Aluminum Sulfate—	sedimentation and recycling of clarified effluent.
Chlorine-caustic—	sedimentation, chemical precipitation—coagulation—sedimentation, filtration, carbon adsorption, neutralization, water recycling, and water conservation practices.
Hydrochloric Acid—	segregation of cooling water, collection of spills and leaks for recycle or land disposal.
Hydrofluoric Acid—	lime precipitation, coagulation flocculation, sedimentation and neutralization.
Hydrogen peroxide	(organic method)—Biological oxidation of organic solvents, sedimentation.
Lime—	dry collection of dust.
Nitric Acid—	segregation of cooling water, collection of spills and leaks for recycle or land disposal.
Phosphorus—	sedimentation and recycle.
Sulfuric Acid—	segregation of cooling water, collection of spills and leaks for recycle or land disposal.

[2557] SPECIFIC FOR PRODUCT

Aluminum Chloride—Level B is based upon reducing suspended solids in the scrubber wastewaters which do not use alkaline solutions to a level of 25 mg/l. Level A is based upon reducing suspended solids levels in alkaline scrubber solutions to 15 mg/l since this type of wastewater would produce an

aluminum hydroxide precipitate that will readily flocculate and settle to produce a clarified effluent. Those concentrations are used to calculate the achievable wasteload from water usage and production data in the General Technologies Report.

Aluminum Sulfate—Level B is based on lime neutralization followed by sedimentation and recycle of a portion of the effluent. Level A is based on total recycle from the treatment pond which is practiced in 10 of 12 plants in the MCA wastewater survey data. Plants producing iron-free Aluminum Sulfate may require special consideration.

Chlorine-Caustic—Effluent levels for suspended solids are based on 25 mg/l from settling ponds for the B level and 15 mg/l for the A level. Waste loads for suspended solids limits in pounds per ton of chlorine production are based on flow data from the General Technologies Report, the MCA survey and data supplied by the Chlorine Institute. Flow basis numbers are for process water only. Much of the data available includes cooling water or is from plants where cooling water and process water are not separated. To meet both A & B levels, it is expected that process water and cooling water separation and water recycle will be required.

[2558] The mercury effluent limitation of 0.1 pounds per day for the entire chlor-alkali . . . is to be measured at the outlet from the mercury treatment unit. Should there be another process at the location that has an effluent containing mercury, that stream must be treated in the mercury treatment unit and thus be included in the 0.1 pound per day limitation. Mercury residuals (i.e., mercury picked up between the treatment unit outlet and the discharge to the stream) are frequently a problem. Where residuals are a demonstratable problem, identify the quantity of mercury involved and develop a program with schedules for correction.

Lead generally separates out in settling ponds but may require soda ash or caustic treatment. Projects for installation of metal anodes provide benefits that will pay for the installa-

tion and eliminate lead in the effluent. Estimates of their present use indicate that one third of the plants use metal anodes now and an additional third have them under active consideration.

Hydrochloric Acid (chlorine burning process)—Level B is based on caustic neutralization of acid leaks and wastewater from the scrubber. Hydrochloric acid processes are quite commonly located at the same site as caustic chlorine plants and as such, the acid wastewaters can be used to neutralize alkaline wastewaters. Level A is achieved by returning leaks to the process or by neutralization and land disposal.

[2559] *Hydrofluoric Acid*—Level B can be achieved by treating effluents with lime to a pH of 10-11. This neutralizes the sulfuric acid, reduces the fluoride content to 5 ppm and suspended solids to 25 ppm. Acidification of the effluent reduces pH to 9 or less. Level A is based on a large reduction of process water flow achieved by recycle and 15 ppm suspended solids. This is documented by data from one plant.

Hydrogen Peroxide (organic process)—The B level is based on the disposal of the biodegradable solvent waste, either by discharge to a municipal biological treatment system or a solvent collection and recycling system. The A level is based on achieving 15 ppm suspended solids removal in the final effluent by coagulation.

Lime—Level B is based upon the discharge of wet scrubber waste to a settling pond with effluent containing 20 ppm suspended solids. Level A has no waterborne discharge since wet scrubber waste can be eliminated using dry collection methods.

Nitric Acid—Effluent from the process is due to leaks. Level B is based on neutralization of leakage with caustic. Level A is based on return of the leakage to the process or by land disposal of leaks.

Phosphorus—B levels are achieved by phosphorous burial, lime and settling pond treatment for solvable phosphates and fluorides and dry collection of solid phosphates. A small part

of the flow to the settling [2560] pond is discharged. The remainder is recycled. Recycle of water from the settling ponds provides the basis for Level A.

Sulfuric Acid—Wastes from this process are leaks. Level B is achieved by lime and settling pond treatment of the leaks to 25 ppm suspended solids. Level A is achieved by returning the leakage to the process. It may be necessary to give special consideration to operations producing high quality product.

GENERAL CONSIDERATIONS

The pH level of any discharge stream from any process in these industries must be within a range of 6.0 to 9.0. The adjustment of pH presents no difficulty in the treatment of waste. Total neutralization may be undesirable in some cases due to TDS loads or natural buffering capacities.

Concentration limits for heavy metals will be established by the Regional Administrator. A guidance document on this subject is being prepared. Limits are needed on each metal present but the limit will vary depending on what other metals are present that cause a synergistic effect. Heavy metals include, but are not limited to, copper, zinc, cadmium, tin, selenium, nickel, lead, and chromium.

All solid waste materials generated within the industrial complex or collected from the waste treatment facilities, including such items as [2561] chemical sludges and filter cakes are to be disposed of in a well managed and well designed chemical land fill to prevent leachades and overflows from entering navigable waters or their tributaries.

Heat is a potential pollution problem in the inorganic chemical industry. Where settling basins and precipitation processes are used in the treatment of waste, there should be sufficient retention time to cool the stream down to acceptable temperature levels. However, some of the processes may not include this type of treatment. Calculation methods to determine

thermal loadings are presently being derived by Office of Enforcement and General Counsel to assist EPA Regional personnel in processing permit applications. However, thermal discharges must be in compliance with all applicable water quality standards (Federal and/or State).

The process wastewater from a particular plant should be limited on total pounds of a particular pollutant per day. The total pounds per day is the product of the pounds per unit of production multiplied by the production capacity.

In applying these limitations the source of water used in the plant must be taken into consideration. Where the source is the same as the receiving water the limitations applied are "net" increases. Where the source is municipal, private water supply, well water, or water from another drainage basin, the limitations applied are "gross" load.

[2562] The effluent guidelines are based on process wastewater, i.e., that coming in contact with process materials. This does not include noncontact cooling water, cooling tower blowdown or boiler blowdown.

VIOLATIONS

The effluent limitations shown in Attachments A and B are average values. It shall be considered a violation of the waste discharge permit if the average values based on daily 24-hour composite samples over any 20 consecutive working days exceeds the limitations placed on any parameter in Attachment A or B.

It shall be considered a violation of the waste discharge permit if any single composite sample exceeds the limitations shown in Attachments A or B more than 50 percent.

Four violations in any one single year will require an action memorandum from the Regional Administrator containing recommendations on what action is to be taken.

Any single violation of the permit may be considered grounds for revocation.

SAMPLING AND MONITORING

Sampling and monitoring is to be required to adequately characterize the effluent quality. Generally, only those parameters present in significant [2563] quantity need to be monitored. A review of data after an initial plan has been in effect for 6 months is in order to make adjustments as needed. Where there is potential for discharge of hazardous materials, spot checks will be needed at suitable intervals. Flow measurements may be other than continuous if continuous measurement is impractical and if the proposed alternate adequately characterizes the flow. Samples should be taken just prior to the discharge to the stream (except mercury—described elsewhere).

Analytical methods will be by Standard Methods, 13th edition, 1971. However, alternate methods may be approved upon submission of acceptable information and justification.

[2564] **Suggested Sampling and Analyses Requirements**

Parameter	*Sample Type*	*Frequency*
Flow	Continuous	Continuous
Temperature	Continuous	Continuous
pH	Continuous	Continuous
Chemical Oxygen Demand	24-hr Composite	Twice Weekly
Suspended Solids	24-hr Composite	Three Times Weekly
Alkalinity	Grab	Twice Weekly
Total Dissolved Solids	24-hr Composite	Three Times Weekly
Grease and Oil	Grab	Once Weekly
Chlorides	24-hr Composite	Three Times Weekly
Sulfates	24-hr Composite	Three Times Weekly

Monitor for the following parameters if present:

Chlorinated Hydrocarbons   BOD

Phenol

Sampling and Analyses for Specific Industries

Industry	*Parameter*		
Chloro-Alkali; Hg Cell	Mercury	24-hr Composite	Daily
Chloro-Alkali; Diaphragm Cell	Lead	24-hr Composite	Twice Weekly
Hydrofluoric Acid	Fluorides	24-hr Composite	Twice Weekly
	Silicates	24-hr Composite	Twice Weekly
Aluminum Chloride	Aluminum	24-hr Composite	Twice Weekly
Phosphorus-Electrolytic	Phosphate	24-hr Composite	Twice Weekly
	Aluminum	24-hr Composite	Once Weekly
	Fluoride	24-hr Composite	Twice Weekly

[2565] **X. REFERENCES**

1. Industrial Waste Study of Inorganic Chemicals, Alkalies and Chlorine, U.S. Environmental Protection Agency draft report by General Technologies Corporation, 1821 Michael Faraday Drive, Reston, Virginia 22070, (July 23, 1971) 131 pages.

2. Manufacturing Chemists Association Wastewater Survey of the Inorganic Chemicals Industry, (June 1972).

3. Inorganic Chemicals Industry Profile (updated) by Datagraphics by Cyrus William Rice & Company, July 1971.

4. Industrial Waste Study—Mercury—Using Industries by Litton Systems, Inc., July 1971.

[2566] **ATTACHMENT A**

Inorganic Chemicals, Alkali and Chlorine Industry Effluent Guidelines

		Lb per Ton of Product	
Product	*Flow Basis* Gal/Ton*	*Total Suspended Solids*	*Other by Note*
ALUMINUM CHLORIDE	120	0.015	
ALUMINUM SULFATE	No waterborne process effluent		
CAUSTIC CHLORINE:**			
Diaphragm Cell	8,000	1.0	1
Mercury Cell	5,000	0.6	2
Downs Cell	7,300	0.9	—
HYDROCHLORIC ACID (Chlorine burning)	No waterborne process effluent		
HYDROFLUORIC ACID	4,672	0.6	3
HYDROGEN PEROXIDE (Organic process)	8,600	1.1	4
LIME/CALCINATION	No waterborne process effluent		
NITRIC ACID	No waterborne process effluent		
PHOSPHORUS	No waterborne process effluent		
SULFURIC ACID (Sulfur burning contact plants)	No waterborne process effluent		

pH range is 6-9 for all products

NOTES: 1. 0.04 #/ton lead
2. 0.1 #/day mercury for the entire operation without regard to capacity***
3. 0.2 #/ton fluorides
4. 0.06 #/ton TOC

*The flow basis numbers are to show how numbers were derived and are not intended as flow limitations.

**Units are per ton of chlorine production.

***The EPA goal of no mercury discharge may reduce this number as it becomes practical.

[2567] **ATTACHMENT B**

Inorganic Chemicals, Alkali and Chlorine Industry Effluent Guidelines

		Lb per Ton of Product	
Product	*Flow Basis* Gal/Ton*	*Total Suspended Solids*	*Other by Note*
Aluminum Chloride	120	0.025	–
Aluminum Sulfate	400	0.08	–
Caustic Chlorine**			
Diaphragm Cell	30,000	6.3	1
Mercury Cell	20,000	4.3	2
Downs Cell	7,300	1.5	–
Hydrochloric Acid (Chlorine burning)	1,000	–	–
Hydrofluoric Acid	36,000	7.5	3
Hydrogen Peroxide (Organic process)	8,600	1.8	–
Lime/Calcination	200	0.03	4
Nitric Acid	86	0.01	–
Phosphorus	8,000	1.7	5
Sulfuric Acid (Sulfur burning contact process)	1,200	0.25	–

pH range is 6-9 for all products

NOTES: 1. 0.2 #/ton, lead
2. 0.1 #/day of mercury for the entire operation without regard to capacity
3. 1.5 #/ton, fluorides
4. 0.03 #/ton, COD
5. 0.2 #/ton, phosphates; 0.2 #/ton, fluorides; 0.001 #/ton, elemental phosphorus

*The flow basis numbers are to show how numbers were derived and are not intended as flow limitations.

**Units are per ton of chlorine production.

* * * *

[38 *Fed. Reg.* 21202 (August 6, 1973)]

[4330] **NOTICES**

ENVIRONMENTAL PROTECTION AGENCY

EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS OF PERFORMANCE FOR NEW SOURCES

Advance Notice of Public Review Procedures

Advance notice is hereby given concerning notices of proposed rule making to be published by the Environmental Protection Agency ("EPA") with respect to effluent limitations guidelines, standards of performance, and pretreatment standards for new sources pursuant to sections 304(b) 306 and 307(c) of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251, 1314, 1316 and 1317(c); 86 Stat. 816 et seq.; Pub. L. 92–500) ("the Act"). The purpose of this notice is to facilitate public comment upon the regulations to be promulgated under sections 304(b), 306 and 307(c), both before and after the publication of the notices of proposed rule making. In addition, this notice will explain EPA's overall plans for development of effluent limitations guidelines and standards of performance for new sources and the approach which is being taken by the Agency in discharging the duties placed upon the Administrator under sections 304(b), 306 and 307(c) of the Act.

EPA believes that the exposure of the technical basis and reasoning underlying regulations to be established pursuant to sections 304(b), 306 and 307(c) is essential to the promulgation of sound effluent limitations guidelines and standards of performance for new sources. At the same time, because of the deadlines for action imposed upon the Administrator under the Act, both EPA and the public will be pressed to analyze and resolve highly complex and important issues in a relatively short time. In order both to develop sound regulations and meet the time schedules set by the Act, EPA intends to identify as many issues and elicit points of criticism at the earliest possible time. To resolve such issues often will require further staff work and management decision-making within EPA and may necessitate substantial redrafting of regulations and sup-

port documents. Therefore, extensive external review cannot be postponed until internal EPA review of initial recommendations for effluent limitations guidelines and standards of performance has been completed, but must proceed concurrently with EPA's own internal review and decision-making if the Act's deadlines are to be met.

EPA has already begun this process by seeking comments upon draft technical reports from persons and organizations known to be interested in particular source categories. These reports (which are discussed further below) contain tentative recommended effluent limitations guidelines and standards of performance. This notice seeks to supplement this already initiated external review and facilitate further review and public comment in late August and early September, when notices of proposed rule making will be published in the FEDERAL REGISTER. The notice is divided into three parts. First, the basic legal authority for regulations concerning effluent limitations guidelines and standards of performance for new sources will be set forth. Second, EPA's general methodology will be described. Third, the means by which EPA has to date, and will in the future, seek the widest possible public scrutiny of the technical and legal basis for the regulations to be established will be explained.

1. *Legal authorities*—(a) *Existing point sources.* Section 301(b) of the Act requires the achievement by not later than July 1, 1977, of effluent limitations for point sources, other than publicly owned treatment works, which require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 304(b) of the Act. Section 301(b) also requires the achievement by not later than July 1, 1983, of effluent limitations for point sources, other than publicly owned treatment works, which require the application of the best available technology economically achievable which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Administrator pursuant to section 304(b) of the Act.

Section 304(b) of the Act requires the Administrator to publish regulations providing guidelines for effluent limitations setting forth the degree of effluent reduction attainable through the application of the best practicable control technology currently available (the 1977 requirement) and the degree of effluent reduction attainable through the application of the best control measures and practices achievable including treatment techniques, process and procedure innovations, operating methods and other alternatives (the 1963 requirements).

(b) *New sources.* Section 306 of the Act requires the achievement by new sources of a Federal standard of performance providing for the control of the discharge of pollutants which reflects the greatest degree of effluent reduction which the Administrator determines to be achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants.

Section 306(b)(1)(B) of the Act requires the Administrator to propose regulations establishing Federal standards of performance for categories of new sources included in a list published pursuant to section 306(b)(1)(A) of the Act. The Administrator published in the FEDERAL REGISTER of January 16, 1973, (38 FR 1624) a list of source categories for which standards of performance for new sources will initially be established. Section 306(a)(2) defines "new source" as "any source, the construction of which is commenced after the publication of proposed regulations prescribing a stand- [4331] ard of performance under this section which will be applicable to such source * * *."

Section 307(c) of the Act requires the Administrator to promulgate pretreatment standards for a category of new sources at the same time that standards of performance for that category are promulgated pursuant to section 306. EPA presently plans to include in proposed and promulgated regulations establishing standards of performance for new sources, provisions which will require application of pretreatment standards which are consistent with EPA's proposed pretreatment stand-

ards for existing sources. The basis for the latter standards is set forth in the FEDERAL REGISTER of July 19, 1973 (38 FR 19236) under 40 CFR Part 128. The provisions and rationale of Part 128 are equally applicable to sources which would constitute "new sources", under section 306 if they were to discharge pollutants directly to navigable waters, except for § 128.133. That section provides a pretreatment standard for "incompatible pollutants" which requires application of the "best practicable control technology currently available," subject to an adjustment for amounts of pollutants removed by the publicly owned treatment works. Since the pretreatment standards to be promulgated under section 307(c) apply to new sources, the regulations establishing standards of performance for new sources will amend § 128.133 to require application of the standard of performance for new sources rather than the "best practicable" standard applicable to existing sources under sections 301 and 304(b) of the Act.

2. *EPA's methodology*–(a) *Overall approach.* The technical studies discussed below and the development of regulations for effluent limitations guidelines and standards of performance are undertaken in the following manner. The point source category is first studied for the purpose of determining whether separate limitations and standards are appropriate for different segments within the category. This analysis includes a determination of whether differences in raw material used, product produced, manufacturing process employed, age and size of plants, waste water constituents and other factors require development of separate limitations and standards for different segments of the point source category. The raw waste characteristics for each such segment are then identified. This includes an analysis of (1) the source, flow and volume of water used in the process employed and the sources of waste and waste waters in the plant; and (2) the constituents of waste waters. The constituents of the waste waters which should be subject to effluent limitations guidelines and standards of performance are then identified.

Next, the control and treatment technologies existing within each segment are identified. This includes an identification of

each distinct control and treatment technology, including both in-plant and end-of-process technologies, which exists or is capable of being designed for each segment. It also includes an identification of the effluent level resulting from the application of each of the treatment and control technologies, in terms of the amount of constituents and the chemical, physical, and biological characteristics of pollutants. The problems, limitations and reliability of each treatment and control technology are also identified. In addition, any non-water quality environmental impact, such as the effects of the application of such technologies upon other pollution problems, including air, solid waste, noise and radiation is examined. Finally, the energy requirements of each control and treatment technology are determined, as well as the cost of the application of such technologies.

This information is then evaluated in order to determine what levels of technology constitute the "best practicable control technology currently available", "best available technology economically achievable" and the "best available demonstrated control technology, processes, operating methods, or other alternatives." In identifying such technologies, various factors are considered including the total cost of the application of technology in relation to the effluent reduction benefits to be achieved from such application, the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes and non-water quality environmental impact (including energy requirements).

The data on which the above analysis was performed included EPA permit applications, EPA sampling and inspections, industry submissions and consultant reports, including the reports discussed below.

(b) *Technical studies.* Studies of some thirty point source categories for which regulations will initially be promulgated were instituted by EPA as soon as possible after passage of the Federal Water Pollution Control Act Amendments of 1972 (October 18, 1972). These studies constitute in-depth analyses of the technological feasibility and economic costs of reducing

or eliminating discharges of pollutants. The studies, along with other information obtained by EPA in the course of internal and external review of the resulting reports or otherwise available to EPA, will serve as a foundation for the regulations to be issued under section 304(b) and 306 of the Act.

To have attempted to amass within the Agency in a very short period of time the large number of technical personnel with experience in the many diverse point source categories to be covered would have been impractical. Therefore, the overall data base and initial analysis has been obtained through contracts with qualified technical consultants. These consultants were instructed to perform in-depth studies of each point source category, under the supervision and with the assistance of EPA, in accordance with the methodology described above. The resulting draft reports include initial tentative recommendations with respect to the effluent limitations guidelines and standards of performance for the particular point source category concerned. The draft reports and recommendations are then subjected to extensive internal and external review. The contractors are assisting in the initial collection and collation of the data base. The responsibility for establishing effluent limitations guidelines and standards of performance for new sources, of course, remains with EPA.

For each of the point source categories covered by the technical studies, EPA is also conducting supplementary studies of the economic impact which could result from application of alternative control and treatment technologies. These studies add to the economic analyses already undertaken as part of the technical studies, which center upon the investment and operating costs associated with various alternative control and treatment technologies, by estimating the broader economic effects which might result from the required application of various technologies. The economic impact studies will investigate effects of alternative approaches in terms of product price increases, effects upon employment and the continued viability of affected plants, effects upon foreign trade and other com-

petitive effects. These reports may be obtained in the same manner as the EPA draft reports, as discussed in section 3(c) below.

Contractors' technical studies of the following point source categories have been completed:

1. Pulp, Paper and Paperboard Mills
2. Builders Paper and Board Mills
3. Meat Product and Rendering Processing
4. Dairy Product Processing
5. Grain Mills
6. Canned and Preserved Fruits and Vegetables Processing
7. Canned and Preserved Seafood Processing
8. Beet Sugar Processing
9. Cane Sugar Processing
10. Textile Mills
11. Cement Manufacturing
12. Feedlots
13. Electroplating
14. Organic Chemicals Manufacturing
15. Inorganic Chemicals Manufacturing
16. Plastics and Synthetic Materials Manufacturing
17. Soap and Detergent Manufacturing
18. Fertilizer Manufacturing
19. Petroleum Refining
20. Iron and Steel Manufacturing
21. Nonferrous Metals Manufacturing
22. Phosphate Manufacturing
23. Steam Electric Powerplants
24. Ferroalloy Manufacturing
25. Leather Tanning and Finishing
26. Glass Manufacturing
27. Insulation Fiberglass Manufacturing
28. Timber Products Processing
29. Beet Sugar Processing Industry
30. Insulation Fiberglass Industry

3. *Public participation in the development of regulations*—(a) *Review of the draft contractors' reports.* The completed contractors' reports are presently undergoing intensive analysis within [4332] EPA and are also receiving extensive external review and comment. This process of internal and external review is being carried on simultaneously in order to make the most of the time available under the Act. Once the contractors' draft reports are received by EPA, they are immediately distributed to a list of external reviewers for critical analysis. The persons or institutions listed below have been sent the draft reports. They have been asked to comment within 30 days so there will be time for their comments to be taken into account by EPA when preparing proposed rule making documents.

States

Alabama Water Improvement Commission
State Office Building
Montgomery, Alabama 36104

State of Alaska
Department of Environmental Conservation
Pouch O
Juneau, Alaska 99801

Commission of Arizona State Department of Health
4019 N. 33rd Avenue
Phoenix, Arizona 95017

Department of Pollution Control and Ecology
1100 Harrington Avenue
Little Rock, Arkansas 72202

California State Water Resources Control Board
Sacramento, California 95814

Water Pollution Control Division
Colorado Department of Health
4210 E 11th Avenue
Denver, Colorado 80220

Division of Water Compliance and Hazardous Substances
Department of Environmental Protection
State Office Building
Hartford, Connecticut 06115

Department of Natural Resources and Environmental Control
Capitol Complex
Tatnall Building
Dover, Delaware 19901

Department of Pollution Control
2562 Executive Center Circle East
Tallahassee, Florida 32301

Environmental Protection Division
Department of Natural Resources
47 Trinity Avenue, S.W.
Atlanta, Georgia 30334

Assistant Director for Environmental Health
Hawaii State Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Indiana Stream Pollution Control Board
1330 West Michigan Street
Indianapolis, Indiana 46206

State of Idaho
Department of Environmental and Community Services
State House
Boise, Idaho 83720

Water Quality Management Division
Department of Environmental Quality
Lucos State Office Building
Des Moines, Iowa 50319

Division of Environmental Health
Kansas State Department of Health
535 Kansas Avenue
Topeka, Kansas 66603

Kentucky Water Pollution Control Commission
275 East Main Street
Frankfort, Kentucky 40601

Louisiana Stream Control Commission
P.O. Drawer FC
University Station
Baton Rouge, Louisiana 70803

Environmental Health Division
Louisiana State Board of Health
New Orleans, Louisiana

Department of Environmental Protection
State House
Augusta, Maine 04430

Water Resources Administration
Tower State Office Building
D2 Water Resources
Annapolis, Maryland 21401

Division of Water Pollution Control
State Office Building
100 Cambridge Street
Boston, Massachusetts 02202

Michigan Water Resources Commission
Steven T. Mason Building
Lansing, Michigan 45916

Minnesota Pollution Control Agency
State Board of Health Building
717 Delaware Street, SE
Minneapolis, Minnesota 55440

Mississippi Air and Water Pollution Control Commission
P.O. Box 827
Jackson, Mississippi 39205

Missouri Clean Water Commission
P.O. Box 154
Jefferson City, Missouri 65101

Division of Environmental Sanitation
State Department of Health
Cogswell Building
Helena, Montana 59601

Department of Environmental Control
1420 P Street
Lincoln, Nebraska 60509

Nevada Commission of Environmental Protection
201 South Fall Street
Carson City, Nevada 89701

New Hampshire Water Supply and Pollution Control Commission
Prescott Park
105 Loudon Road
Concord, New Hampshire 03301

Department of Environmental Protection
P.O. Box 1390
Trenton, New Jersey 08625

New Mexico Environment Improvement Agency
P.O. Box 2348
Santa Fe, New Mexico 87501

Industrial Waste Bureau
New York State Department of Environmental Conservation
50 Wolf Road
Albany, New York 12201

Office of Air and Water Resources
Department of Natural and Economic Resources
P.O. Box 27687
Raleigh, North Carolina 27611

Environmental Health and Engineering Services
Department of Health
State Capitol
Bismarck, North Dakota 58501

Ohio Environmental Protection Agency
Columbus, Ohio 43216

Department of Pollution Control
2241 N.W. 40th Street
Oklahoma City, Oklahoma 73112

Oregon Department of Environmental Quality
1234 S.W. Morrison
Portland, Oregon 97205

Bureau of Sanitary Engineering
Department of Environmental Resources
P.O. Box 2351
Harrisburg, Pennsylvania 17120

Division of Water Pollution Control
Rhode Island Department of Health
State Office Building
Providence, Rhode Island 02903

South Carolina Pollution Control Authority
P.O. Box 11628
Columbia, South Carolina 29311

Division of Sanitary Engineers and Environmental
Protection
State Department of Health
State Capitol
Pierre, South Dakota 57501

Division of Water Quality Control
Department of Public Health
621 Cordell Hull Building
Nashville, Tennessee 37219

Texas Water Control Board
P.O. Box 13246
Capitol Station
Austin, Texas 78711

Bureau of Environmental Health
Division of Health
44 Medical Drive
Salt Lake City, Utah 84113

Vermont Agency of Environmental Conservation
Montpelier, Vermont 05602

Virginia State Water Control Board
1010 State Office Building
Richmond, Virginia 23219

Washington Department of Ecology
P.O. Box 829
Olympia, Washington 98504

West Virginia Division of Water Resources
Department of Natural Resources
1201 Greenbriar Street
Charleston, West Virginia 25311

Division of Environmental Protection
Wisconsin Department of Natural Resources
P.O. Box 450
Madison, Wisconsin 53701

Sanitary Engineering Services
Division of Health and Medical Services
Department of Health and Social Services
State Office Building
Cheyenne, Wyoming 82001

Territories

Environmental Quality Commission
Government of Samoa
Pago-Pago, Tutuila
American Samoa 96920

Water Pollution Control Program
Government of Guam
P.O. Box 2816
Agana, Guam 96910

Environmental Quality Board
P.O. Box 11785
San Juan, Puerto Rico 00910

Office of High Commission
Division of Environmental Health
Trust Territory of the Pacific Islands
Saijsan Mariana Island 92950

River Basin Commissions

Delaware River Basin Commission
25 State Police Drive
West Trenton, New Jersey 08628

New England Interstate Water Pollution Control
Commission
[4333] 607 Boylston Street
Boston, Massachusetts 02116

Ohio River Valley Sanitation Commission
414 Walnut Street
Cincinnati, Ohio 45202

The reports have also been transmitted to the following agencies or organizations:

Agencies and Offices of/or Related to the Federal Government

Department of Agriculture
Atomic Energy Commission
Department of Commerce
Department of Defense
Federal Power Commission
Department of Health, Education, and Welfare
Department of Housing and Urban Development
Department of the Interior
Office of the Energy Advisor
Department of the Treasury
National Industrial Pollution Control Council
U.S. Department of Commerce
Water Resources Council
Tennessee Valley Authority

Public Interest Groups

The American Society of Civil Engineers
The American Society of Mechanical Engineers
Businessmen for the Public Interest
Conservation Division
National Wildlife Federation
The Conservation Foundation
Environmental Defense Fund, Inc.
Hudson River
Sloop Restoration, Inc.
Natural Resources Defense Council
Water Pollution Control Federation

Industry Trade Associations or Companies

The Aluminum Association
Aluminum Smelting and Recycling Institute
American Corn Millers Federation
American Electroplaters' Society
American-Florida Sugar Cane League
American Frozen Food Institute
American Hardboard Association

American Iron and Steel Institute
American Livestock Feeders Association
American Meat Institute
American Mining Congress
American National Cattleman's Association
American Paper Institute
American Petroleum Institute
American Plywood Association
American Public Power Association
American Shrimp Canners Association
American Wood Preservers Association
American Wood Preservers Institute
American Textile Manufacturers Institute
A.S.G. Industries, Inc.
Atomic Industrial Forum, Inc.
Beet Sugar Development Foundation
Carpet and Rug Institute
Catfish Farmers of America
Chesapeake Bay Seafood Industries Association, Inc.
Chlorine Institute
Copper and Brass Fabricators Council
Corn Refiners Association, Inc.
Dairy Industry Committee
Dimmitt Agricultural Industry
Edison Electric Institute
Environmental Pollution Control Program
Glass Container, Inc.
The Ferroalloy Association
The Fertilizer Institute
Ford Motor Company
Glass Division
Glass Containers Manufacturers Institute
Hawaiian Sugar Planters Association
Hardwood Plywood Manufacturing Association
Institute of American Poultry Industries
International Institute of Synthetic Rubber Producers
Libbey-Owens-Ford Co.
Manufacturing Chemists Association
Metal Finishers Suppliers Association
Miller's National Federation
National Association of Electric Companies
National Association of Metal Finishers

National Broiler Council
National Canners Association
National Council of the Paper Industry for Air and Stream Improvement, Inc.
National Independent Meat Packers Association
National Fisheries Association
National Forest Products Association
National Milk Producers Federation
National Pork Producers Association
National Renders Association, Inc.
National Rural Electric Cooperative Association
Northern Textile Association
National Soft Wheat Millers Association
Portland Cement Association
P.P.G. Industries, Inc.
Protein Cereal Products Institute
Puerto Rico Land Administration
Rice Millers Association
Rubber Manufacturing Association
Technical Association of the Pulp and Paper Industry
Soap and Detergent Association
Synthetic Organic Chemical Manufacturers Association
Tanner's Council of America, Inc.
Tennessee Valley Public Power Association
Tuna Research Foundation, Inc.
Technical Association of the Pulp and Paper Industry
United States Beet Sugar Association
United States Cane Sugar Refiner's Association
Western States Meat Packers Association
Western Wood Preserver Association

(b) *Public availability of draft technical reports.* The draft reports are voluminous and rapid reproduction in large quantities is difficult to accomplish. In order to maximize the usefulness of early external review of the reports, the reports must be transmitted to interested persons immediately upon receipt by EPA. Printing of substantial quantities of the reports would consume two to three weeks and, under applicable federal regulations, no more than approximately 160 copies of the reports may be provided through outside printing contracts. The 160 copies of the report supplied by the contractors have already been largely exhausted in transmissions to the organiza-

tions listed above, and for internal review purposes within EPA. However, a copy of every report is available in each of EPA's regional offices, which are listed in the Appendix to this notice, and a complete set of the reports is also available in EPA's Washington offices (Office of Public Affairs, Environmental Protection Agency, Room W-227, Waterside Mall, Washington, D.C. 20460). The Washington Office will also maintain a complete set of comments received from the public upon draft reports and upon the notices of proposed rule making which will subsequently be published. The draft reports, revised EPA reports which are described below, and all public comments, will be available for inspection and copying during regular business hours. Under EPA's information regulations (40 CFR, Part 2), a fee may be required for making copies.

In addition to review of the EPA Copies of the reports, interested persons may in many instances obtain a copy of a draft report by contacting an organization listed above with which they have an affiliation or by seeking to review a copy in the possession of the appropriate State agency.

(c) *Public availability of EPA draft reports.* Upon conclusion of internal and external review of the initial draft reports and their tentative recommendations, an EPA draft report will be prepared in support of proposed regulations to be issued in the FEDERAL REGISTER. The EPA draft report will be published simultaneously with the notice of proposed rule making. The EPA draft report may be different from the contractors' reports, particularly as to the assessment of practicability or availability of technology, and the conclusions reached with respect to effluent limitations guidelines and standards of performance for new sources.

However, EPA does not anticipate that the EPA report will be markedly different in terms of the fundamental data base for the regulations. In most cases, major issues or objections to the approach taken or the conclusions reached in the EPA draft report will have already been raised by the contractors' draft report. Criticisms of the adequacy of the data base and the analytical methods employed should therefore be expressed now rather than after the notice of proposed rule making.

Nevertheless, EPA does not regard the contractors' draft report as an official EPA document and additional comments will, of course, be solicited once the EPA draft report and the associated proposed regulations are published (A final EPA report will also be prepared and published in support of the final regulations promulgated under sections 301, 304(b), 306 and 307(c).) The EPA draft report will be sent to the list of reviewers set forth earlier in this notice. In addition, EPA is establishing a mailing list of other persons wishing to obtain a copy of the EPA draft report. Any person wishing to be included on the list should so request as soon as possible, but no later than August 20, 1973. The request should be addressed to the "EPA Information Center, Attention: Mr. Philip B. Wisman, Environmental Protection Agency, Room W–327, Waterside Mall, Washington, D.C. 20460", and should indicate which specific reports the person or organization is interested in receiving. EPA will transmit a copy of the EPA draft report to those on the mailing list, as soon as the report is available. Copies of the EPA draft reports will otherwise be transmitted, upon request to EPA, at the address just quoted, as soon as possible. The economic studies referred to in section 2(b) above will be made available upon request in the same manner as the EPA draft reports.

EPA desires to make copies of all reports available to interested parties wishing to comment as soon as possible. EPA therefore requests the cooperation of the [4334] public who are interested in, but not directly affected by, the proposed regulations in awaiting the final EPA report to be published after the final regulation is printed in the FEDERAL REGISTER, rather than requesting copies of the EPA draft reports.

(d) *Solicitation of public comments.* By seeking comments upon the initial draft reports which have already been prepared, and the initial recommended guidelines and standards which those reports contain, much of the analysis and comment which would ordinarily occur after notices of proposed rule making are published is taking place now. In this way the resolution of many issues can be accomplished even before notices of proposed rule making are published. These issues

will be identified and their resolution explained in the notices of proposed rule making. Issues which remain unresolved will be highlighted in the notices. In addition, EPA hopes to enable all interested parties to be sufficiently familiar with the complex technical details underlying the proposed effluent limitations and standards so that they can respond to notices of proposed rule making in a relatively short time. In order to meet the deadlines imposed by the Act, the present plan is that the notices of proposed rule making will request formal, public comments within 21 days of publication of the notices in the FEDERAL REGISTER. Those persons who have indicated their desire to be included on the mailing list described above will receive copies of EPA's draft report supporting the proposed regulations in the FEDERAL REGISTER. As noted, these reports will reflect EPA's judgment as to the proper regulations; however, they will be based in large part upon the initial draft reports (which will have been available in most cases since early July 1973) and any comments received thereon.

EPA will consider all comments received up to the time indicated in the notices of proposed rule making. In addition, to the extent time allows, early comments upon the initial draft reports will be considered when developing proposed rule making regulations.

(e) *Conclusion.* In summary, EPA is, by this notice, seeking to encourage as wide ranging and thorough public review prior to proposal and promulgation of effluent limitations guidelines and standards of performance as is possible within the time allowed. The following specific steps may be taken by interested persons:

1. Submit comments upon initial draft reports and economic studies. To facilitate rapid transmission of comments to the persons concerned within EPA, and also have a copy which is immediately available for public review, EPA requests that comments be submitted in triplicate. All comments received before or after publication of the notice of proposed rule making, as well as all technical and economic reports, will be available for inspection and copying at the Office of Public

Affairs, Room 227, West Tower, Waterside Mall, during regular business hours (8:00 a.m.–4:30 p.m.).

2. Request inclusion on a mailing list for the EPA draft reports and economic studies which will be published about the same time as notices of proposed rule making in the FEDERAL REGISTER. Requests to be included on the mailing list should be received by August 20, 1973 and should indicate which specific reports are requested.

3. Comment upon the notices of proposed rule making and the associated draft EPA technical and economic reports. All comments received within 21 days after publication of the notices in the FEDERAL REGISTER will be considered.

4. All public comments, requests to be included on the mailing list for reports and other requests for reports may be addressed to "EPA Information Center, Attention: Mr. Philip B. Wisman, Environmental Protection Agency, Room W–327, Waterside Mall, Washington, D.C. 20460."

In conclusion, it should be emphasized that EPA seeks comments upon its overall approach and legal interpretation of its responsibilities under sections 304(b), 306 and 307(c) of the Act, as well as upon the technical aspects of the initial draft reports, and the EPA reports to be issued. However, it should be also emphasized that the early expression of comments is essential if EPA is to be able to make whatever adjustments and responses which may be necessary in time to satisfy its responsibilities under the Act. In the event comments are in the nature of criticisms as to the adequacy of data which is available or which may be relied upon by the Agency, comments should identify any additional data which may be available and should indicate how such data is pertinent to the development of regulations under sections 301, 304(b), 306 and 307(c) of the Act. In the event comments address the approach taken to establishing an effluent limitation guideline or standard of performance, EPA solicits suggestions as to what alternative approach should be taken, or result reached, and why and how

this fits with the detailed requirements of sections 304(b), 306 and 307(c) of the Act.

Dated: July 31, 1973.

ROBERT L. SANSOM,
Assistant Administrator for Air and Water Programs.

Appendix

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Director of Public Affairs
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[FR Doc.73–16133 Filed 8–3–73; 8:45 am]

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[4335] This document is available in limited quantities through the U.S. Environmental Protection Agency, Information Center, Room W-327 Waterside Mall, Washington, D.C. 20460.

The document will subsequently be available through the National Technical Information Service, Springfield, Virginia 22151.

[4436] EPA-230/1-73-015
AUGUST 1973

Economic Analyses
of
Proposed Effluent Guidelines

INORGANIC CHEMICALS, ALKALI AND CHLORINE INDUSTRIES (Major Products)

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Planning and Evaluation
Washington, D.C. 20460

[4337] This report has been reviewed by the Office of Planning and Evaluation, EPA, and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

[4338]

PREFACE

The attached document is a contractors' study prepared for the Office of Planning and Evaluation of the Environmental Protection Agency ("EPA"). The purpose of the study is to analyze the economic impact which could result from the application of alternative effluent limitation guidelines and standards of performance to be established under sections 304(b) and 306 of the Federal Water Pollution Control Act, as amended.

The study supplements the technical study ("EPA Development Document") supporting the issuance of proposed regulations under sections 304(b) and 306. The Development Document surveys existing and potential waste treatment control methods and technology within particular industrial source categories and supports promulgation of certain effluent limitation guidelines and standards of performance based upon an analysis of the feasibility of these guidelines and standards in accordance with the requirements of sections 304(b) and 306 of the Act. Presented in the Development Document are the investment and operating costs associated with various alternative control and treatment technologies. The attached document supplements this analysis by estimating the broader economic effects which might result from the required application of various control methods and technologies. This study investigates the effect of alternative approaches in terms of produce price increases, effects upon employment and the continued viability of affected plants, effects upon foreign trade and other competitive effects.

The study has been prepared with the supervision and review of the Office of Planning and Evaluation of EPA. This report was submitted in fulfillment of Task Order NO. 8, Contract 68-01-1541 by Arthur D. Little, Inc. Work was completed as of August 1973.

This report is being released and circulated at approximately the same time as publication in the Federal Register of a notice of proposed rule making under sections 304(b) and 306 of the Act for the subject point source category. The study has not been reviewed by EPA and is not an official EPA publication.

The study will be considered along with the information contained in the development document and any comments received by EPA on either document before or during proposed rule making proceedings necessary to establish final regulations. Prior to final promulgation of regulations, the accompanying study shall have standing in any EPA proceeding or court proceeding only to the extent that it represents the views of the contractor who studied the subject industry. It cannot be cited, referenced, or represented in any respect in any such proceeding as a statement of EPA's views regarding the subject industry.

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[4455] EPA 440/1-73/007

Development Document for
Proposed Effluent Limitations Guidelines
and New Source Performance Standards
for the

MAJOR INORGANIC PRODUCTS

Segment of the
Inorganic Chemicals Manufacturing
Point Source Category

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

AUGUST 1973

[4456] **DEVELOPMENT DOCUMENT**

for

PROPOSED EFFLUENT LIMITATIONS GUIDELINES

and

NEW SOURCE PERFORMANCE STANDARDS

for the

MAJOR INORGANIC PRODUCTS SEGMENT OF THE INORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY

RUSSELL TRAIN
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September, 1973

Effluent Guidelines Division
Office of Air and Water Programs
U.S. ENVIRONMENTAL PROTECTION AGENCY
Washington, D.C. 20460

[4457]

ABSTRACT

This document presents the findings of an extensive study of selected major inorganic chemicals for the purpose of developing effluent limitation guidelines for existing point sources and standards of performance and pretreatment standards for new sources, to implement Sections 304, 306 and 307 of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1551, 1314, and 1316, 86 Stat. 816 et seq.) (the "Act").

Effluent limitations guidelines contained herein set forth the degree of effluent reduction attainable through the application of the best practicable control technology currently available (BPCTCA) and the degree of effluent reduction attainable through the application of the best available technology economically achievable (BATEA) which must be achieved by existing point sources by July 1, 1977 and July 1, 1983 respectively. The standards of performance and pretreatment standards for new sources contained herein set forth the degree of effluent reduction which is achievable through the application of the best available demonstrated control technology, processes, operating methods, or other alternatives.

Based on the application of best practicable technology currently available 14 of the 25 chemicals under study can be manufactured with no discharge of process waste water pollutants to navigable waters. With the best available technology economically achievable 23 of the 25 chemicals can be manufactured with no discharge of process waste water pollutants to navigable waters. No discharge of process waste water pollutants to navigable waters is achievable as a new source performance standard for all chemicals except titanium dioxide.

Supporting data and rationale for development of the proposed effluent limitations guidelines and standards of performance are contained in this report.

[4458]

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[4473]

SECTION III

INTRODUCTION

Purpose and Authority

The United States Environmental Protection Agency (EPA) is charged under the Federal Water Pollution Control Act Amendments of 1972 with establishing effluent limitations which must be achieved by point sources of discharge into the navigable water of the United States.

Section 301(b) of the Act requires the achievement by not later than July 1, 1977, of effluent limitations for point sources, other than publicly owned treatment works, which are based on the application of the best practicable control technology currently available as defined by the Administrator pursuant to Section 304(b) of the Act. Section 301(b) also requires the achievement by not later than July 1, 1983, of effluent limitations for point sources, other than publicly owned treatment works, which are based on the application of the best available technology economically achievable which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Administrator pursuant to Section 304(b) to the Act. Section 306 of the Act requires the achievement by new sources of a Federal standard of performance providing for the control of the discharge of pollutants which reflects the greatest degree of effluent reduction which the Administrator determines to be achievable through the application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants. Section 304(b) of the Act requires the Administrator to publish within one year of enactment of the Act, regulations providing guidelines for effluent limitations setting forth the degree of effluent reduction attainable through the application of the best practicable control technology currently available and the degree of effluent reduction attainable through the application of the best control

measures and practices achievable including treatment techniques, process and procedure innovations, operation methods and other alternatives. The regulations proposed herein set forth effluent limitations guidelines pursuant to Section 304(b) of the Act for the inorganic chemicals manufacturing point source category.

Section 306 of the Act requires the Administrator, within one year after a category of sources is included in a list published pursuant to Section 306(b) (1) (A) of the Act, to propose regulations establishing Federal standards of performances for new sources within such categories. The Administrator published in the Federal Register of January 16, 1973 (38 F.R. 1624), a list of 27 source categories. Publication of the list constituted announcement of the Administrator's intention of establishing, under Section 306, standards of performance [4474] applicable to new sources within the inorganic chemical manufacturing point source category, which was included within the list published January 16, 1973.

SUMMARY OF METHODS USED FOR DEVELOPMENT OF EFFLUENT LIMITATION GUIDELINES AND STANDARDS OF PERFORMANCE

The Environmental Protection Agency has determined that a rigorous approach including plant surveying and verification testing is necessary for the promulgation of effluent standards from industrial sources. A systematic approach to the achievement of the required guidelines and standards includes the following:

(a) Categorization of the industry and determination of those industrial categories for which separate effluent limitations and standards need to be set;

(b) Characterization of the waste loads resulting from discharges within industrial categories and subcategories;

(c) Identification of the range of control and treatment technology within each industrial category and subcategory;

(d) Identification of those plants having the best practical technology currently available (exemplary plants); and

(e) Generation of supporting verification data for the best practical technology including actual sampling of plant effluents by field teams.

The culmination of these activities is the development of the guidelines and standards based on the best practicable current technology.

This report describes the results obtained from application of the above approach to the inorganic chemicals industry. Thus, the survey and testing covered a wide range of processes, products, and types of wastes. Studies of a total of twenty-five chemicals, listed in terms of products below, are summarized in this report. A separate report covering the phosphorus based segment of the phosphorus chemicals industry was also generated under the same contract.

Selected Inorganic Chemicals

Aluminum Chloride	Potassium Metal
Aluminum Sulfate	Potassium Sulfate
Calcium Carbide	Sodium Bicarbonate
Calcium Chloride	Sodium Carbonate (Soda Ash)
Chlorine	Sodium Chloride
Hydrochloric Acid	Sodium Dichromate
Hydrogen Peroxide	Sodium Hydroxide
[4475] Hydrofluoric Acid	Sodium Metal
Calcium Oxide and Calcium Hydroxide (Lime)	Sodium Silicate
Nitric Acid	Sodium Sulfate
Potassium Chromates	Sodium Sulfite
Potassium Hydroxide	Sulfuric Acid
	Titanium Dioxide

Categorization and Waste Load Characterization

The effluent limitation guidelines and standards of performance proposed herein were developed in the following manner. The point source category was first categorized for the purpose of determining whether separate limitations and standards are

appropriate for different segments within a point source category. Such subcategorization was based upon raw material used, product produced, manufacturing process employed, and other factors. The raw waste characteristics for each subcategory were then identified. This included an analysis of (1) the source and volume of water used in the process employed and the sources of waste and waste waters in the plant; and (2) the constituents of all waste waters including harmful constituents and other constituents which result in degradation of the receiving water. The constituents of waste waters which should be subject to effluent limitations guidelines and standards of performance were identified.

The full range of control and treatment technologies existing within each subcategory was identified. This included an identification of each control and treatment technology, including both inplant and end-of-process technologies, which are existent or capable of being designed for each subcategory. It also included an identification of the amount of constituents (including thermal) and the characteristics of pollutants resulting from the application of each of the treatment and control technologies. The problems, limitations and reliability of each treatment and control technology were also identified. In addition, the non-water quality environmental impact, such as the effects of the application of such technologies upon other pollution problems, including air, solid waste, noise and radiation were also identified. The energy requirements of each of the control and treatment technologies were identified as well as the cost of the application of such technologies.

Cost information contained in this report was obtained drectly from industry during exemplary plant visits, from engineering firms and equipment suppliers, and from the literature. The information obtained from the latter three sources has been used to develop general capital, operating and overall costs for each treatment and control method. Costs have been put on a consistent industrial calculation basis of ten year straight line depreciation plus allowance for interest at six [4476] percent per year (pollution abatement tax free money) and inclusion of allowance for insurance and taxes for an overall

fixed cost amortization of fifteen percent per year. This generalized cost data plus the specific information obtained from plant visits was then used for cost effectiveness estimates in Section VIII and wherever else costs are mentioned in this report.

The data for identification and analyses were derived from a number of sources. These sources included EPA research information, published literature, qualified technical consultation, on-site visits and interviews at numerous inorganic chemical plants throughout the U.S., interviews and meetings with various trade associations, and interviews and meetings with various regional offices of the EPA. All references used in developing the guidelines for effluent limitations and standards of performance for new sources reported herein are included in Section XIII of this report.

Exemplary plant selection

The following exemplary plant selection criteria were developed and used for the selection of exemplary plants.

(a) Discharge effluent quantities

Plants with low effluent quantities or the ultimate of no pollutants discharge were preferred. This minimal discharge may be due to reuse of water, raw material recovery and recycling, or to use of evaporation. The significant parameter was minimal waste added to effluent streams per weight of product manufactured. The amount of wastes considered here were those added to waters taken into the plant and then discharged.

(b) Effluent contaminant level

Preferred plants were those with lowest effluent contaminant concentrations and lowest total quantity of waste discharge per unit of product.

(c) Water management practices

Use of good management practices such as water re-use, planning and inplant water segregation, and the proximity of

cooling towers to operating units where airborne contamination of water can occur were considered.

(d) Land utilization

The efficiency of land use was considered.

(e) Air pollution and solid waste control

[4477] Exemplary plants must possess overall effective air and solid waste pollution control where relevant in addition to water pollution control technology. Care was taken to insure that all plants chosen have minimal discharges into the environment and that exemplary sites are not those which are exchanging one form of pollution for another of the same or greater magnitude.

(f) Effluent treatment methods and their effectiveness

Plants selected shall have in use the best currently available treatment methods, operating controls, and operational reliability. Treatment methods considered included basic process modifications which significantly reduce effluent loads as well as conventional treatment methods.

(g) Plant facilities

All plants chosen as exemplary had all the facilities normally associated with the production of the specific chemical(s) in question. Typical facilities generally were plants which have all their normal process steps carried out on-site.

Plant management philosophy

Plants were preferred whose management insists upon effective equipment maintenance and good housekeeping practices. These qualities are best identified by a high operational factor and plant cleanliness.

(h) Geographic location

Factors which were considered are plants operating in close proximity to sensitive vegetation or in densely populated areas. Other factors such as land availability and differences in state and local standards were also considered.

(i) Raw materials

Differences in raw material purities were given strong consideration in cases (e.g., TiO_2) where the amounts of wastes are strongly influenced by the purity of raw materials used. Several plants using different grades of raw materials were considered for those chemicals for which raw material purity is a determining factor in waste control. Chemicals where this was found to be of importance are titanium dioxide, aluminum sulfate, the dichromates, and to a lesser extent chlorine and sodium chloride.

(j) Diversity of processes

On the basis that all of the above criteria are met, consideration was given to installations having a multiplicity of manufacturing processes. [4478] However, for sampling purposes, the complex facilities chosen were those for which the wastes could be clearly traced through the various treatment steps.

(k) Production

On the basis that other criteria are equal, consideration was given to the degree of production rate scheduled on water pollution sensitive equipment.

(l) Product purity

For cases in which purity requirements play a major role in determining the amounts of wastes to be treated and the degree of water recycling possible, different product grades were considered for subcategorization.

Sampling of Exemplary Plants

The details of how the exemplary plants were sampled and the analytical techniques employed are fully discussed in Section V, of this report.

GENERAL DESCRIPTION OF THE INDUSTRY

Brief descriptions of each of the twenty-five chemical industries are presented in subsequent subsections. Process flow sheets for the industries may be found in Sections IV and V.

Production tonnages reported for 1971 were taken from Current Industrial Reports, Inorganic Chemicals, U.S. Bureau of Census, Series M28A(71)–14.(1) These values are summarized in Table I, at the end of this section. Also included are production tonnages for years prior and subsequent to 1971, where available, and the number of plants producing each chemical.

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[4861]

THURSDAY, OCTOBER 11, 1973

WASHINGTON, D.C.

Volume 38 ■ Number 196

PART II

ENVIRONMENTAL PROTECTION AGENCY

■

Effluent Limitations Guidelines and Standards of Performance and Pretreatment

Proposed Rules

[4862] **ENVIRONMENTAL PROTECTION AGENCY**

[40 CFR Part 415]

EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS OF PERFORMANCE AND PRETREATMENT FOR INORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY

Notice of Proposed Rulemaking

Notice is hereby given that effluent limitations guidelines for existing sources and standards of performance and pretreatment standards for new sources set forth in tentative form below are proposed by the Environmental Protection Agency (EPA) for the aluminum chloride production subcategory (Subpart A), the aluminum sulfate production subcategory (Subpart B), the calcium carbide production subcategory (Subpart C), the calcium chloride production subcategory (Subpart D), the calcium oxide and hydroxide production subcategory (Subpart E), the chlorine and sodium or potassium hydroxide production subcategory (Subpart F), the hydrochloric acid production subcategory (Subpart G), the hydrofluoric acid production subcategory (Subpart H), the hydrogen peroxide production subcategory (Subpart I), the nitric acid production subcategory (Subpart J), the potassium metal production subcategory (Subpart K), the potassium dichromate production subcategory (Subpart I), the potassium sulfate production subcategory (Subpart M), the sodium bicarbonate production subcategory (Subpart N), the sodium carbonate production subcategory (Subpart O), the sodium chloride production subcategory (Subpart P), the sodium dichromate and sodium sulfate production subcategory (Subpart Q), the sodium metal production subcategory (Subpart R), the sodium silicate production subcategory (Subpart S), the sodium sulfite production subcategory (Subpart T), the sulfuric acid production subcategory (subpart U), and titanium dioxide production subcategory (Subpart V), of the inorganic chemicals manufacturing category of point sources pursuant to sections 301, 304(b) and (c), 306(b) and 307(c) of the Federal Water

Pollution Control Act, as amended (33 U.S.C. 1251, 1311, 1314 (b) and (c), 1316(b) and 1317(c); 86 Stat. 816 et seq.; Pub. L. 92-500) (the "Act").

(a) *Legal authority.* (1) *Existing point sources.* Section 301(b) of the Act requires the achievement by not later than July 1, 1977, of effluent limitations for point sources, other than publicly owned treatment works, which require the application of the best practicable control technology currently available as defined by the Administrator pursuant to Section 304(b) of the Act. Section 301(b) also requires the achievement by not later than July 1, 1983, of effluent limitations for point sources, other than publicly owned treatment works, which require the application of best available technology economically achievable which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Administrator pursuant to section 304(b) of the Act.

Section 304(b) of the Act requires the Administrator to publish regulations providing guidelines for effluent limitations setting forth the degree of effluent reduction attainable through the application of the best practicable control technology currently available and the degree of effluent reduction attainable through the application of the best control measures and practices achievable including treatment techniques, process and procedure innovations, operating methods, and other alternatives. The regulations proposed herein set forth effluent limitations guidelines, pursuant to section 304(b) of the Act, for the aluminum chloride production subcategory (Subpart A), the aluminum sulfate production subcategory (Subpart B), the calcium carbide production subcategory (Subpart C), the calcium chloride production subcategory (Subpart D), the calcium oxide and hydroxide production subcategory (Subpart E), the chlorine and sodium or potassium hydroxide production subcategory (Subpart F), the hydrochloric acid production subcategory (Subpart G), the hydrofluoric acid production subcategory (Subpart H), the hydrogen peroxide production subcategory (Subpart I), the nitric

acid production subcategory (subpart J), the potassium metal production subcategory (Subpart K), the potassium dichromate production subcategory (Subpart L), the potassium sulfate production subcategory (Subpart M), the sodium bicarbonate production subcategory (Subpart N), the sodium carbonate production subcategory (Subpart O), the sodium chloride production subcategory (Subpart P), the sodium dichromate and sodium sulfate production subcategory (Subpart Q), the sodium metal production subcategory (Subpart R), the sodium silicate production subcategory (Subpart S), the sodium sulfite production subcategory (Subpart T), the sulfuric acid production subcategory (Subpart U), and titanium dioxide production subcategory (Subpart V), of the inorganic chemicals manufacturing category.

(2) *New sources.* Section 306 of the Act requires the achievement by new sources of a Federal standard of performance providing for the control of the discharge of pollutants which reflects the greatest degree of effluent reduction which the Administrator determines to be achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants.

Section 306(b)(1)(B) of the Act requires the Administrator to propose regulations establishing Federal standards of performance for categories of new sources included in a list published pursuant to section 306(b)(1)(A) of the Act. The Administrator published in the FEDERAL REGISTER of January 16, 1973, (38 FR 1624) a list of 27 source categories, including the inorganic chemicals manufacturing category. The regulations proposed herein set forth the standards of performance applicable to new sources for the alumnium chloride production subcategory (Subpart A), the aluminum sulfate production subcategory (Subpart B), the calcium carbide production subcategory (Subpart C), the calcium chloride production subcategory (Subpart D), the calcium oxide and hydroxide production subcategory (Subpart E), the chlorine and sodium or potassium hydroxide production subcategory (Subpart F), the hydro-

chloric acid production subcategory (Subpart G), the hydrofluoric acid production subcategory (Subpart H), the hydrogen peroxide production subcategory (Subpart I), the nitric acid production subcategory (Subpart J), the potassium metal production subcategory (Subpart K), the potassium dichromate production subcategory (Subpart L), the potassium sulfate production subcategory (Subpart M), the sodium bicarbonate production subcategory (Subpart N), the sodium carbonate production subcategory (Subpart O), the sodium chloride production subcategory (Subpart P), the sodium dichromate and sodium sulfate production subcategory (Subpart Q), the sodium metal production subcategory (Subpart R), the sodium silicate production subcategory (Subpart S), the sodium sulfite production subcategory (Subpart T), the sulfuric acid production subcategory (Subpart U), and titanium dioxide production subcategory (Subpart V), of the inorganic chemicals manufacturing category.

Section 307(c) of the Act requires the Administrator to promulgate pretreatment standards for new sources at the same time that standards of performance for new sources are promulgated pursuant to section 306. Sections 415.15, 415.25, and 415.35, 415.45, 415.55, 415.65, 415.75, 415.85, 415.95, 415.105, 415.115, 415.125, 415.135, 415.145, 415.155, 415.165, 415.175, 415.185, 415.195, 415.205, 415.215, 415.225, proposed below provide pretreatment standards for new sources within the aluminum chloride production subcategory (Subpart A), the aluminum sulfate production subcategory (Subpart B), the calcium carbide production subcategory (Subpart C), the calcium chloride production subcategory (Subpart D), the calcium oxide and hydroxide production subcategory (Subpart E), the chlorine and sodium or potassium hydroxide production subcategory (Subpart F), the hydrochloric acid production subcategory (Subpart G), the hydrofluoric acid production subcategory (Subpart H), the hydrogen peroxide production subcategory (Subpart I), the nitric acid production subcategory (Subpart J), the potassium metal production subcategory (Subpart K), the potassium dichromate production subcategory (Subpart L), the potassium sulfate production subcategory

(Subpart M), the sodium bicarbonate production subcategory (Subpart N), the sodium carbonate production subcategory (Subpart O), the sodium chloride production subcategory (Subpart P), the sodium dichromate and so- [4863] dium sulfate production subcategory (Subpart Q), the sodium metal production subcategory (Subpart R), the sodium silicate production subcategory (Subpart S), the sodium sulfite production subcategory (Subpart T), the sulfuric acid production subcategory (Subpart U), and titanium dioxide production subcategory (Subpart V), of the inorganic chemicals manufacturing category.

Section 304(c) of the Act requires the Administrator to issue to the States and appropriate water pollution control agencies information on the processes, procedures or operating methods which result in the elimination or reduction of the discharge of pollutants to implement standards of performance under Section 306 of the Act. The Development Document referred to below provides pursuant to Section 304(c) of the Act, information on such processes, procedures of operating methods.

(b) Summary and basis of proposed effluent limitations guidelines for existing sources and standards of performance and pretreatment standards for new sources. (1) *General methodology.* The effluent limitations guidelines and standards of performance proposed herein were developed in the following manner. The point source category was first studied for the purpose of determining whether separate limitations and standards are appropriate for different segments within the category. This analysis included a determination of whether differences in raw material used, product produced, manufacturing process employed, age, size, waste water constituents and other factors require development of separate limitations and standards for different segments of the point source category. The raw waste characteristics for each such segment were then identified. This included an analysis of (1) the source, flow and volume of water used in the process employed and the sources of waste and waste waters in the operation and (2) the constituents of all waste water. The constituents

of the waste waters which should be subject to effluent limitations guidelines and standards of performance were identified.

The control and treatment technologies existing within each segment were identified. This included an identification of each distinct control and treatment technology, including both in-plant and end-of-process technologies, which are existent or capable of being designed for each segment. It also included an identification of, in terms of the amount of constituents and the chemical, physical, and biological characteristics of pollutants, the effluent level resulting from the application of each of the technologies. The problems, limitations and reliability of each treatment and control technology were also identified. In addition, the non-water quality environmental impact, such as the effects of the application of such technologies upon other pollution problems, including air, solid waste, noise and radiation, were identified. The energy requirements of each control and treatment technology were determined as well as the cost of the application of such technologies.

The information, as outlined above, was then evaluated in order to determine what levels of technology constitute the "best practicable control technology currently available," "the best available technology economically achievable" and the "best available demonstrated control technology, processes, operating methods, or other alternatives." In identifying such technologies, various factors were considered. These included the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application, the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements) and other factors.

The data upon which the above analysis was performed included EPA permit applications, EPA sampling and inspections, consultant reports, and industry submissions.

The pretreatment standards proposed herein are intended to be complementary to the pretreatment standards proposed

for existing sources under Part 128 of 40 CFR. The basis for such standards are set forth in the FEDERAL REGISTER of July 19, 1973, 38 FR 19236. The provisions of Part 128 are equally applicable to sources which would constitute "new sources," under section 306 if they were to discharge pollutants directly to navigable waters, except for § 128.133. That section provides a pretreatment standard for "incompatible pollutants" which requires application of the "best practicable control technology currently available," subject to an adjustment for amounts of pollutants removed by the publicly owned treatment works. Since the pretreatment standards proposed herein apply to new sources, §§ 415.15, 415.25, 415.35, 415.45, 415.55, 415.65, 415.75, 415.85, 415.95, 415.105, 415.115, 415.125, 415.135, 415.145, 415.155, 415.165, 415.175, 415.185, 415.195, 415.205, 415.215, and 415.225 below amend § 128.133 to require application of the standard of performance for new sources rather than the "best practicable" standard applicable to existing sources under sections 301 and 304(b) of the Act.

(2) Summary of conclusions with respect to the inorganic chemicals manufacturing category of point sources.

(i) *Categorization.* For the purpose of establishing effluent limitations guidelines and standards, the inorganic chemicals manufacturing category was divided into twenty-two discrete subcategories consistent with the specific chemicals produced. Various other means to group the twenty-two chemicals into subcategories were investigated. Factors such as raw waste loads, water requirements, and manufacturing processes do not establish a sound basis for subcategorization because the raw materials used and production processes employed are specific for each chemical. Although certain waste water constituents may be reduced to similar concentrations for selected chemical groupings, the quantities of pollutants discharged based on production volume are different for each chemical because of specific water requirements.

Thus, for the purpose of these regulations, a subcategory was established for each chemical product. This subcategorization scheme simplifies the application of effluent limitations guidelines because inorganic chemical plants vary significantly in

terms of product mix. This scheme also reflects differences in the treatability of waste streams due to the manufacturing process variables unique to each chemical.

(ii) Process descriptions, water use and waste water characterization for each chemical subcategory

(1) Aluminum chloride. Anhydrous aluminum chloride is manufactured by the reaction of gaseous chlorine with molten aluminum metal. Chlorine is introduced below the surface of the molten aluminum. The aluminum chloride sublimes and is collected by condensation.

No water is used in the process except in cases where a wet scrubber is used to eliminate the discharge of unreacted chlorine gas to the atmosphere. The wet scrubbing solution may be sold as a byproduct or recycled after the precipitation of aluminum salts.

(2) Aluminum sulfate. Aluminum sulfate is produced by the reaction of bauxite ore with concentrated sulfuric acid. Ground ore and acid are reacted in a digester, yielding aluminum sulfate in solution plus muds and insoluble waste materials. These waste products are removed during sedimentation and filtration. The filtered product liquor is either shipped as liquid aluminum sulfate or evaporated to recover a solid product. Waste muds may be ponded to settle the solids and the clear water may be recycled.

(3) Calcium carbide. Calcium carbide is prepared by the reaction of calcium oxide with carbon in a high temperature furnace. The product is then cooled, crushed, screened, packaged, and shipped. The only wastes from this process are airborne dusts from the furnace coke dryer, from screening and from the packing station. All collected dusts may be returned to the furnace.

(4) Calcium chloride. The limitations presented herein apply only to the brine extraction process of manufacturing calcium chloride. Salt is solution-mined and the resulting brines concentrated to remove sodium chloride by precipitation and then purified by the addition of other materials to precipitate sodium, potassium, and magnesium ions. The process wastes are weak brine solutions from the blowdown of the various brine purification steps.

(5) Calcium oxide and hydroxide. Calcium oxide and hydroxide are produced by calcining various types of limestone in continuous vertical or rotating kilns. This is a dry process, and the only waterborne wastes result from wet scrubbing of the gaseous kiln effluent to remove particulates.

[4864] After calcination, the calcium oxide and hydroxide are cooled and packaged as a lump product or crushed and screened to yield a pulverized product.

(6) Chlorine and sodium or potassium hydroxide. The major chlorine production results from the electrolysis of sodium or potassium brines. Sodium hydroxide or potassium hydroxide are produced as byproducts. Two types of electrolysis cells may be used.

In the mercury cell process, the raw material is dissolved and purified by addition of barium carbonate, soda ash, and lime to remove magnesium, calcium, and sulfate ion prior to electrolysis. The insolubles formed are filtered from the brine, which is fed into a mercury cell, where chlorine is liberated at one electrode and a sodium-mercury amalgam is formed at the other.

The chlorine formed is cooled, dried in a sulfuric acid stream, purified to remove chlorinated organics, compressed and sold. The mercury-sodium amalgam formed is treated with water to decompose the amalgam. Sodium hydroxide and hydrogen are formed in the reaction. The mercury liberated is returned to the electrolysis cells. The hydrogen is cooled, scrubbed to remove traces of mercury, compressed and sold.

The sodium hydroxide formed during the decomposition of the amalgam is filtered, concentrated, and sold. Waste brines emerging from the electrolysis cells are concentrated and recycled.

In the diaphragm cell process, chloride brines are first purified and then electrolyzed in a diaphragm cell. Chlorine,

formed at one electrode, is collected, cooled, dried with sulfuric acid, purified, compressed, and liquefied. At the other electrode, sodium hydroxide is formed and hydrogen is liberated. The hydrogen is cooled, purified, and compressed. The sodium hydroxide formed, along with unreacted brine, is evaporated to 50 percent concentration. During the partial evaporation, most of the unreacted sodium chloride precipitates and is removed by filtration for recycle to the process. The sodium hydroxide solutions are further evaporated to yield solid products.

(7) Hydrochloric acid. Hydrochloric acid may be manufactured by two major processes. The process considered herein is direct reaction of chlorine with hydrogen. The other major source of production is as a byproduct of organic chlorination reactions.

In production by direct reaction, hydrogen and chlorine gas are reacted in a vertical burner. The product, hydrogen chloride, is cooled and then absorbed in water. No waterborne wastes are generated during normal operation. The start-up wastes may be treated and reused.

(8) Hydrofluoric acid. Hydrofluoric acid is manufactured by reacting the mineral fluorspar (CaF_2) with concentrated sulfuric acid in a furnace. The hydrofluoric acid leaves the furnace as a gas, is cooled and absorbed in water prior to purification. In the purification system, the crude acid is redistilled and either absorbed in water or compressed for sale as anhydrous hydrofluoric acid.

(9) Hydrogen peroxide. Hydrogen peroxide is manufactured by three different processes: (1) an electrolytic process; (2) oxidation of alkyl hydroanthraquinones; and (3) as a byproduct in the manufacture of acetone from isopropyl alcohol. The limitations presented herein apply only to the first two processes.

In the electrolytic process, a solution of ammonium (or other) bisulfate is electrolyzed, yielding ammonium persulfate at the anode and hydrogen gas at the cathode. The persulfate is then reacted with water to yield hydrogen peroxide and

the original bisulfate. In the oxidation process, alkylanthraquinone is reduced by hydrogen over a supported metal catalyst (typically palladium on alumina), yielding the corresponding alkylhydroanthraquinone. This, in turn, is oxidized by oxygen in a forced gas stream to produce the original alkylanthraquinone plus hydrogen peroxide. The hydrogen peroxide is extracted with water and the alkylanthraquinone is recycled.

(10) Nitric acid. Nitric acid is produced by catalytic oxidation of ammonia to nitrogen dioxide which is reacted with water vapor under pressure to obtain the acid. In the process, compressed, purified, and preheated air and anhydrous ammonia are mixed and passed over a platinum-rhodium wire gauge catalyst. The resultant mixture of nitric oxide and excess air is introduced into a stainless steel absorption tower where the nitric oxide is oxidized. The resulting nitrogen dioxide is then reacted with water. The only process wastes from a well-designed plant are weak nitric acid solutions which may be recycled.

(11) Potassium metal. Potassium is produced by the reaction of potassium chloride with sodium vapors. No water is used in this manufacturing process. The potassium chloride is melted in a gas-fired melt pot and is fed to an exchange column. The molten potassium chloride is contacted by ascending sodium vapors, yielding sodium chloride and elemental potassium. The sodium chloride is normally recovered and sold.

(12) Potassium dichromate. Most potassium dichromate manufactured in the U.S. is made by reacting a sodium dicromate dihydrate solution with potassium chloride. The potassium dichromate is crystallized from solution resulting in a relative pure product which requires only removal of water prior to sizing and packaging. The process water may be recycled back to the initial reaction tank.

(13) Potassium sulfate. Potassium sulfate is prepared by treating dissolved langbenite ore ($K_2SO_4 \bullet 2MgSO_4$), a naturally occurring potassium magnesium sulfate mineral, with potassium chloride. The ore is crushed and dissolved in water to which potassium chloride is added. Partial evaporation of

the solution results in selective precipitation of potassium sulfate. This is recovered by centrifugation or filtration, dried and sold. The resulting brine liquor may be held in evaporation ponds, reused as process water, or evaporated to dryness to recover magnesium chloride.

(14) Sodium bicarbonate. Sodium bicarbonate is made by reacting sodium carbonate with water and carbon dioxide under pressure. The bicarbonate precipitates from solution and is centrifuged or filtered, washed, dried, and packaged. Treated process waste water may be recycled after concentration with respect to sodium carbonate.

(15) Sodium carbonate. Sodium carbonate (soda ash) is produced by the Solvay process or by the mining of trona (sodium sesquicarbonate) in California and Wyoming.

The Solvay process involves a reaction of ammonia and carbon dioxide in a brine solution to yield sodium bicarbonate. This is converted to the carbonate by heating. Ammonia may be recovered by adding slaked lime to the used liquor. Large quantities of dissolved and suspended solids are generated by this process. A typical effluent after sedimentation and neutralization contains over 100,000 mg/l of dissolved materials (mainly NaCl and $CaCl_2$).

The mining of trona currently accounts for approximately forty percent of sodium carbonate production.

(16) Sodium chloride. Sodium chloride may be produced by solution brine mining, by solar evaporation of sea water, or by conventional mining of rock salt. The regulations presented herein apply to the first two processes. Solar evaporation to produce sodium chloride consists of holding sea water in large ponds where the water is allowed to evaporate. After saturation is reached, the brine is fed to a crystallizer where sodium chloride is precipitated. The brine solution may be further treated to recover potassium and magnesium salts. Solution-mining of brines involves pumping water into an underground salt deposit and recovering the brine solution for treatment. The specific treatment is variable depending on the nature of the impurities present. Typically, the brine may be first

aerated to remove hydrogen sulfide and, in many cases, small amounts of chlorine are added to complete sulfide removal and oxidize all iron salts present to the ferric state. The brine is then pumped to settling tanks where it is treated with calcium carbonate and sodium hydroxide to remove most of the calcium, magnesium and iron present as insoluble salts. After clarification to remove these insolubles, the brine is then sent to multiple effect evaporators. As water is removed, salt crystals form and are removed as a slurry. After screening to remove lumps, the slurry is then washed with fresh brine. The washed slurry is filtered, the mother liquor is returned to the evaporators and the salt crystals from the filter are dried, screened, and packaged.

Waste water results from the multiple evaporators and dryers and from the brine purification processes.

(17) Sodium dichromate and sodium sulfate. Sodium dichromate and sodium sulfate are prepared by calcining a mix- [4865] ture of chrome ore, sodium carbonate, and lime, followed by leaching the soluble chromates with water. Calcium salts are precipitated by pH adjustment and then removed along with iron oxide. The leachate containing the soluble chromate is then acidified with sulfuric acid, forming sodium dichromate and sodium sulfate. The dichromate solution is partially evaporated and fed to a crystallizer where sodium dichromate crystals are formed. The crystals are centrifuged to remove excess water, then dried and packaged.

The sulfate is precipitated following the partial evaporation process. The leachate is filtered and dried. The insoluble residue remaining from the leaching operation may be recycled to leach out additional material.

(18) Sodium metal. The process used to manufacture sodium metal, commonly called the Downs cell process, consists of the electrolysis of fused sodium chloride at about 600° C. The salt is mixed with alkali fluorides and calcium chloride to sufficiently lower the melting point, and the charge is then fused in a Downs cell. Molten sodium formed at the cathode is transported to a collection vessel, from which the metal is

withdrawn from the bottom, filtered, and packaged in the form of bricks of various sizes.

It is essentially a dry process. However, water-borne wastes are generated during cleanout and washdown of cells when the electrolyte is replenished, from scrubbing chlorine tail gases and also from drying the chlorine with sulfuric acid.

(19) Sodium silicate. The production of sodium silicate generally involves reacting soda ash or anhydrous sodium hydroxide with silica. The product is then dissolved in water under pressure to prepare sodium silicate solutions. The water-borne wastes include unreacted silica, sodium hydroxide and sodium silicate. The pollutants are the result of tank wash-downs, product shock cooling with water and wet scrubbers. These wastes may be ponded to settle the solids and the clear liquid may be partially recycled and partially pond evaporated. The waste solution may be further reacted with sodium hydroxide to manufacture metasilicates which may be isolated by evaporation and sold.

(20) Sodium sulfite. Sodium sulfite is manufactured by reacting sulfur dioxide with soda ash. The sulfur dioxide gas is fed into a solution of sodium carbonate until the product is acidic. The solute consists mainly of sodium bisulfate which is converted into sodium sulfite by the further addition of soda ash. The solution is boiled to evolve carbon dioxide. The crude sulfite is filtered to remove insolubles, crystallized and dried.

The wastes consist of sulfides from the purification steps, and sulfites and sulfates which result from periodic wash-downs. The sulfite may be oxidized to sulfate by aeration and suspended solids removed by filtration.

(21) Sulfuric acid. Sulfuric acid is manufactured primarily by the contact process which involves the burning of sulfur to sulfur dioxide. The sulfur dioxide is catalytically oxidized to sulfur trioxide which is reacted with water to yield sulfuric acid. Within the contact process there are three basic types of plants: (i) Double absorption plants use paired sulfur trioxide absorption towers and catalyst beds in series to maximize conversion of sulfur dioxide so that tail gas scrubbers are not required; (ii) single absorption plants use single towers and catalyst beds and tail gases frequently have to be scrubbed to remove sulfur oxides; and (iii) spent acid plants use spent sulfuric acid in place of, or in addition to, sulfur as a raw material.

The regulations presented herein apply only to the first two plant types. In the double absorption contact process, sulfur is burned to yield sulfur dioxide which is then passed through a catalytic converter with air to produce sulfur trioxide. The sulfur trioxide is then absorbed in 95–97 percent sulfuric acid. The gases emerging from the absorber are then fed to a second converter to oxidize the remaining sulfur dioxide to sulfur trioxide, which is then absorbed in a second absorption tower. The tail gases are vented to the atmosphere. They are sufficiently depleted of sulfur oxides so that gas scrubbers are not required. Prevention of leaks and spills can eliminate the discharge of process waste water pollutants.

The single absorption process differs from that previously described only in the arrangement of the converters and absorbers. The rest of the process is the same. For the single absorption process, the sulfur dioxide is passed through one or more converters and then into one or more absorbers prior to venting to the atmosphere. These tail gases usually need to be scrubbed and the waste water treated.

(22) Titanium dioxide. Titanium dioxide may be manufactured using either the chloride or sulfate process. In the sulfate process, ground ilmenite ore ($FeO\ TiO_2$) is digested with concentrated sulfuric acid at high temperatures. The acid used is normally about 150 percent of the weight of the ore. In some cases, small amounts of antimony trioxide are also added. The resulting sulfates of titanium and iron are then leached from the reaction mass with water and any ferric salts present are reduced to ferrous salts by treatment with iron scrap to prevent coloration of the titanium dioxide.

After these operations, the solutions are clarified, cooled and sent to a vacuum crystallizer. There, ferrous sulfate crystallizes

out and is separated from the mother liquor by centrifugation. This material is either sold or disposed of as a waste.

The mother liquor is clarified by filtration after addition of filter aids and further concentrated by vacuum evaporation. Seed crystals or other nucleating agents are added and then concentrated liquor is treated with steam to hydrolyze the titanium sulfate present. This precipitates as acidic hydrated titanium. The precipitate is collected by filtration, washed several times and calcined at 900–950°C to yield titanium dioxide. This calcined product is ground, and further processed to yield a purer product.

In the manufacture of titanium dioxide by the chloride process, ores containing titanium dioxide, iron, aluminum, vanadium, plus other minor trace impurities, are dried to remove moisture, then fed up to a high temperature fluidized bed chlorinator. Coke needed to promote chlorination is also dried and fed to the reactor.

The gaseous reaction products contain titanium tetrachloride, ferrous and ferric chlorides, carbon monoxide and dioxide, hydrogen chloride (from the hydrogen in the coke and ore, etc.), entrained coke and ore, plus all other chlorinated impurities in the ore. These pass to a long cooling train which cools the product stream so that all of the iron chlorides and most of the remaining metal chlorides condense. Solids are separated from the gaseous titanium tetrachlorides by centrifugation or other mechanical means and slurred in water for discharge from the process as raw waste.

The remaining gaseous titanium tetrachloride is then condensed. Noncondensable reaction gases, containing small amounts of titanium tetrachloride, silicon tetrachloride and hydrogen chloride are water scrubbed, then vented.

Crude titanium tetrachloride is purified to remove traces of silicon, vanadium, iron, magnesium, manganese, aluminum, chromium, etc., by various techniques including distillation, absorption, ion exchange, and chemical precipitation with hydrogen sulfide, inorganic salts, or organic compounds. All methods yield a pure titanium tetrachloride fraction, and a

contaminant sludge which is slurred in water and discharged with the cooling tower waste.

The pure titanium tetrachloride is vaporized, superheated, and added to the oxidation reactor with hot air or oxygen to form a pure, finely divided, pigmentary titanium dioxide.

The oxidation reactor product stream, consisting primarily of chlorine, nitrogen, and suspended titanium dioxide is cooled and the titanium dioxide separated mechanically by means of cyclones, bag filters, or precipitators for further processing. Chlorine and nitrogen from the oxidation product stream are fed to the chlorinator with makeup chlorine to produce more titanium tetrachloride. The recovered pigment is calcined and surface treated to impact desirable optical or physical properties. The titanium dioxide is ground to submicron sized particles, and packed as finished product.

(iii) Control and treatment technology for the inorganic chemicals manufacturing category.

Although waste effluents from inorganic chemical plants widely differ in both chemical nature and raw waste loadings, many pollution control techniques and treatment processes are common throughout the industry. Good control and containment practices may significantly reduce the quantity of water [4866] requiring treatment. These practices include monitoring techniques, safety practices, in-process abatement measures, spill and leak prevention, containment provisions, and segregation practices.

The purity of the raw materials used in many manufacturing processes significantly influences the waste load. Economics and availability, however, necessitate use of impure ores and technical grade reactants. These impurities may be controlled by washing, purifying, separating or beneficiating the raw materials prior to use in the manufacturing process. Treatment of ores may be done at the mining site where beneficiating waste may be controlled and handled with minimal pollutant effects.

Segregation of waste streams is an important waste control technique. Large uncontaminated water streams should be

separated from the process waste water to minimize the quantity of water requiring treatment.

Spills and leaks can be minimized by employing good housekeeping practices. Provisions for containment and isolation of occasional leaks and spills may be implemented.

Many waterborne wastes result from product losses in bottling, packing, or shipping areas. Good engineering and housekeeping may be used to reduce losses to a minimum.

In many manufacturing processes wet scrubbers are used to control air pollution. The scrubbing solution may generally be treated and reused or sold. In some cases, conversion to a dry abatement system is justified because of product recovery.

Unit operations and processes to treat process waste water streams in the inorganic chemicals manufacturing category include sedimentation, filtration, clarification, chemical treatments, centrifugation, ion exchange, carbon adsorption, and evaporation. The specific treatment technique and resulting effluent quality depend on the waste load generated by each manufacturing process.

Fourteen chemical manufacturing processes, including the production of aluminum chloride, aluminum sulfate, calcium carbide, hydrochloric acid, calcium oxide, potassium, potassium sulphate, sodium bicarbonate, sodium chloride (by the solar evaporation process), sodium silicate, and sulfuric acid, generate relatively small quantities of waste water. The process waste streams generally may be treated and recycled, reused, evaporated for product recovery, or sold.

The following chemical processes generate waste streams which require treatment to reduce quantities of suspended solids. They include calcium chloride production by solution brine-mining, hydrogen peroxide production by the organic process, sodium production, sodium chloride production by solution-mining and sodium carbonate production by the Solvay process. Treatment generally consists of various liquid-solid separation operations including sedimentation and filtrations to reduce effluent concentrations of suspended solids to 25 mg/l.

Neutralization of acidic or alkaline streams is required. Recycle and reuse of various waste streams are possible. Additional treatment and in-process changes (replacement of barometric condensers with noncontact heat exchangers, for example) make chemical production feasible with no discharge of process waste water pollutants for all processes except soda ash production. Additional treatment of soda ash waste will reduce the suspended solids concentration to 15 mg/l.

The remaining manufacturing processes, hydrogen peroxide production by the electrolytic process, sodium dichromate and sodium sulfate production, chlor-alkali facilities using either the diaphragm or mercury cell process and titanium dioxide production by the chloride or sulfate process, require treatment to reduce suspended solids concentrations. In addition, the effluent contains dissolved metals which are present in potentially harmful quantities. The presence of these pollutants, including mercury, lead, chromium and other metals, necessitates additional treatment specific for the potentially harmful pollutant present. Cyanide solutions from the electrolytic process to manufacture hydrogen peroxide may be passed through an ion exchange system and oxidized to a cyanate solution. Chloralkali plants using the mercury cell process may treat mercury-containing streams with sodium sulfide. Lead discharges from the diaphragm cell process may be eliminated by use of stable metal anodes. Hexavalent chromium resulting from the production of sodium dichromate may be reduced to trivalent chromate and precipitated with lime or caustic.

Additional treatment based on available technologies and various in-process modifications make it possible to produce the above named chemicals, except titanium dioxide, with no process waste water discharge. Although acid recovery and reuse is being investigated in the titanium dioxide production process, it has not been demonstrated in large scale operation. Additional treatment will reduce the effluent suspended solids concentration to 15 mg/l.

(iv) Cost estimates and economic impact for control of waste water pollutants in the inorganic chemicals manufacturing category.

Treatment costs to achieve the effluent reductions attainable by the application of the best practicable technology currently available and by application of the best available technology economically achievable are specific for each chemical manufacturing process. The annual cost to achieve the best practicable technology is less than $1/ton of product for fifteen major chemical manufacturing processes. The costs are less than $2/ton of product for five chemicals. Annual treatment costs are $14 and $12/ton of product for hydrofluoric acid and sodium dichromate. Because of the relatively high list price for these chemicals, the treatment costs represent only 2.5 and 3.3 percent of the current list price.

The manufacture of titanium dioxide generates waste water characterized by high pollutant concentrations. Currently only minor treatment is being practiced. The implementation of best practicable technology currently available results in an annual cost of $82/ton of product for the sulfate process and $37/ton of product for the chloride process. These figures are 14 and 6.4 percent of the current list price. Because substitute products may be used only on a limited basis and demand currently exceeds the supply, these costs may be passed on as price increases with minor economic impact.

The incremental annual costs to achieve the degree of reduction attainable by the application of best available technology economically achievable average less than two percent of the current list price for all products from these chemical manufacturing processes. On this basis, it is concluded that these guidelines and standards will have no major economic impact and that the guidelines and standards set forth in this regulation are economically achievable.

(v) Nonwater quality aspects of pollution control in the inorganic chemicals manufacturing category.

The large volumes of sludge generated by some treatment processes create a substantial solid waste problem. Landfill and lagoon sites of adequate size and good design are essential for treatment processes. Best practicable control technology and best available control technology as they are known today,

require disposal of the pollutants removed from waste waters in this industry in the form of solid wastes and liquid concentrates. In most cases these are non-hazardous substances requiring only minimal custodial care. However, some constituents may be hazardous and may require special consideration. In order to ensure long term protection of the environment from these hazardous or harmful constituents, special consideration of disposal sites must be made. All landfill sites where such hazardous wastes are disposed should be selected so as to prevent horizontal and vertical migration of these contaminants to ground or surface waters. In cases where geologic conditions may not reasonably ensure this, adequate legal and mechanical precautions (e.g., impervious liners) should be taken to ensure long term protection to the environment from hazardous materials. Where appropriate the location of solid hazardous materials disposal sites should be permanently recorded in the appropriate office of legal jurisdiction. Ocean disposal and deep-well injection may be practiced only under strictly regulated conditions, consistent with the requirements of Federal and State laws.

The inorganic chemicals manufacturing category has large energy requirements for furnaces, kilns, calciners, distillations columns, evaporators, and other common equipment. In contrast, application of the suggested treatment practices consumes less than one percent of this amount.

No significant noise or air pollution problems are expected to result because [4867] of the application of water pollution control equipment.

The report entitled "Development Document for Proposed Effluent Limitations Guidelines and News Source Performance Standards for the major inorganic products Segment of the Inorganic Chemicals Manufacturing Point Source Category" details the analysis undertaken in support of the regulations being proposed herein and is available for inspection in the EPA Information Center, Room 227, West Tower, Waterside Mall, Washington, D.C., at all EPA regional offices, and at State water pollution control offices. A supplementary analysis prepared for EPA of the possible economic effects of the proposed

regulations is also available for inspection at these locations. Copies of both of these documents are being sent to persons or institutions affected by the proposed regulations, or who have placed themselves on a mailing list for this purpose (see EPA's Advance Notice of Public Review Procedures, 38 FR 21202, August 6, 1973). An additional limited number of copies of both reports are available. Persons wishing to obtain a copy may write the EPA Information Center, Environmental Protection Agency, Washington, D.C. 20460, Attention: Mr. Philip B. Wisman.

(c) Summary of public participation. Prior to this publication, the agencies and groups listed below were consulted and given an opportunity to participate in the development of effluent limitations guidelines and standards proposed for the phosphate manufacturing category. All participating agencies have been informed of project developments. An initial draft of the Development Document were sent to all participants and comments were solicited on that report. The following are the principal agencies and groups consulted: (1) Effluent Standards and Water Quality Information Advisory Committee (established under section 515 of the Act); (2) all State and U.S. Territory Pollution Control Agencies; (3) the Manufacturing Chemists' Association; (4) the Chlorine Institute; Puerto Rico Land Administration; (5) American Society of Mechanical Engineers; (6) American Society of Civil Engineers; (7) Hudson River Sloop Restoration, Inc.; (8) National Resource Defense Council; (9) Water Pollution Control Federation; (10) the National Wildlife Federation; and (11) Michigan Students Environmental Foundation.

The following organizations responded with comments: Department of Defense; Department of Commerce; Commonwealth of Kentucky; Department for Natural Resources and Environmental Protection; Texas Water Quality Board; Department of Natural Resources; State of Michigan Water Resources Commission; Michigan Student Environmental Confederation, Inc.; Allied Chemical Corporation; the Chlorine Institute, Inc.; American Cyanamid Company; E. I. duPont De Nemours & Company; FMC Corporation; Manufacturing

Chemists' Associations; and Monsanto Industrial Chemicals Company.

The primary issues raised in the development of these proposed effluent limitations guidelines and standards of performance and the treatment of these issues herein are as follows:

(1) The inorganic chemicals manufacturing category is very large and diverse. In establishing effluent guidelines it was necessary to consider numerous factors which may predicate varying the guidelines to accommodate differences in plant size, age, geographical location, manufacturing processes employed and product mix. Comments from various industrial concerns indicate that they feel these variables justify further segmentation of the industry. The key issue is the degree to which the inorganic chemicals manufacturing category should be segmented for the purpose of establishing effluent guidelines and standards of performance. One extreme is to establish one limitation for the entire industry. Examination of the dissimilarities in manufacturing processes and wasteloads generated for each chemical reveal that this approach is technically unsound. On the other extreme, each chemical plant is unique and presents specific treatment problems. If the regulations presented herein are to reflect every variation, it is necessary to have separate guidelines for each plant. This approach does not reflect the intent of the Act and is unworkable.

The approach selected was to examine all variables and segment the industry into workable subcategories consistent with these variations. Twenty-two subcategories have been established based on the chemical product manufactured. In cases where two dissimilar processes are used to manufacture the same product, separate limitations have been established within the subcategory.

While it is recognized that differences in plant age and size will affect the treatment costs to a certain degree, the limitations presented herein may be practicably achieved industry-wide.

Some plants use dry air pollution abatement systems whereas others employ wet scrubbers. Again, it is recognized that it is more difficult for plants using wet scrubbers to achieve the effluent limitations. However, this scrubbing solution may be treated and subsequently recycled or sold. In some cases, product recovery justifies conversion to a dry system.

Other variations, including quality of raw materials, product mix, and geographical locations, are addressed in the Development Document where alternative treatment schemes are presented to demonstrate industry-wide applicability.

(2) Some commentors criticized the methodology used in preparing the effluent limitations and standards of performance. The concept of basing standards on the exemplary plants was questioned. This approach was detailed in the legislative history of the Act and serves as a logical basis for developing guidelines based on best practicable technology currently available. In many cases in the inorganic chemical industry, only one or two plants were considered exemplary based on waste water treatment of effluents generated by the production of a given chemical. Industry representatives interpret "average of the best" to require the compilation of data from a wider segment of the industry. In many cases, however, only one or two plants were demonstrating exemplary treatment practices. Where this treatment was considered economically practicable and applicable industry-wide, it was selected as the basis for guidelines.

(3) Industry representatives and various government agencies questioned the appropriateness of establishing a 1977 standard for fourteen chemicals requiring a zero discharge of process waste water pollutants to navigable waters, when the Act lists this as a national goal to be achieved by 1983.

Technology based standards as detailed in Section 301, 304(b) and 306 require the maximum pollutant reductions prior to 1983 consistent with the economic and technological factors considered under Sections 304(b) and 306. This does not preclude the promulgation of a zero discharge standard for 1977.

All fourteen chemicals are currently being produced in exemplary plants with a zero discharge of process waste water pollutants. Zero discharge may be achieved for ten of the fourteen chemicals at an annual incremental cost of less than one percent of the list price. Three other chemicals may be manufactured with a zero discharge by spending less than four percent of the current list price. Sodium chloride production by brine-mining requires an expenditure of eleven percent of the list price. Because of the relatively low price, however, this results in a price increase of only 0.1 cents/lb of product which will not significantly impact the economy.

(4) Commentors expressed concern about an initial proposal to eliminate the discharge of process waste water pollutants from the Solvay process used to manufacture soda ash. This process generates extremely large quantities of pollutants, most of which are currently discharged with little treatment. An alternate process, mining trona, exists for producing soda ash. This mining operation is relatively clean and produces soda ash at an equitable price. (Shipping costs are offset by large operating costs for the Solvay process plants.) Currently forty percent of the soda ash manufactured in the United States results from mining trona, and production figures indicate that this percentage will continue to increase. There appears to be an ample supply of this ore, sufficient to accommodate the soda ash market for years to come.

It was concluded that no technology is available and economically achievable for the elimination of discharges from Solvay plants. Although the mining option exists, it was felt that Congress did not intend to eliminate large scale operations. The 1983, standard proposed herein requires implementation of the best available treatment technology which is economically achievable for Sol- [4868] vay plants. New source Solvay plants are required to achieve zero discharge of process waste water pollutants, but this will have no impact on existing facilities. It is recognized that this standard may well constitute a prohibition of construction of new Solvay process plants unless some radical new technology is developed. However, ample supplies of soda ash may be obtained by mining trona. More-

over the newest Solvay process plant was constructed in 1933 and there are no known plans to build any new Solvay plants.

(5) Industry felt that the cost data for pollution control equipment given in Section VIII of the Report is underestimated.

The cost information was obtained directly from industry during exemplary plant visits, from engineering firms and equipment suppliers, and from literature. The information obtained from the latter three sources was used to develop general capital, operating and overall costs of each treatment and control method. This data plus the specific information verified by plant visits was used to generate the cost effectiveness curves in Section VIII of the Development Document and wherever else costs are mentioned.

(6) Dissolved solids are presented in significant quantities in the effluent resulting from the manufacture of most inorganic chemicals. Initially, guidelines were proposed limiting the quantities of dissolved solids. Many comments detailed objections to limiting total dissolved solids. In many cases, discharged sulfates and chlorides caused no deleterious effects in receiving waters. The disposal methods for concentrated dissolved solids have large energy requirements. Considering the non-water quality impact and cost-benefit relationship, it was concluded that only harmful dissolved materials (mercury, lead, etc.) could be practicably limited by technology based standards.

(7) Various agencies expressed concern about the ultimate disposal methods for harmful solid materials including mercury, chromium, etc. As detailed in the Development Document, care must be taken to prevent future dissolution of these materials and subsequent pollution of navigable waters by run-off or ground water infiltration. These metals remain soluble and may be carried into ground water unless extraordinary measures are taken to prevent leaching. Ocean dumping and deep-well disposal are allowed only under strictly regulated conditions in accordance with the requirements of applicable Federal and State laws.

(8) Several comments question the economic feasibility of achieving the proposed limitations for chlor-alkali plants. Industry felt that a zero discharge of process waste water pollutants is impossible to achieve, and that further segmentation of the chlor-alkali industry based on size and product mix in individual plants is required.

The effluent limitations based on best practicable technology currently available are being achieved in three exemplary plants. Treatment for both the mercury cell and diaphragm cell chlor-alkali plant effluents consists of incinerating or land-filling chlorinated organic wastes, filtering and settling cell rebuilding wastes, ponding or returning brine purification muds to the brine cavity and partial recycle of the weak brine solutions. In the mercury cell process, curbing and collection of leaks and spills, followed by treatment with sodium sulfide, are required to reduce effluent mercury concentrations.

Although no plants are currently achieving no discharge of process waste water pollutants, the required technology is available and demonstrated. Annual incremental costs to achieve this level are less than one percent of the current list price. Available technology which will effect a zero discharge of pollutants consists of using the spent sulfuric acid solution for neutralization of other plant waste streams, sale as weak acid, sale to an acid regeneration plant for reprocessing or recycling after concentration. The hypochlorite waste from the tail gas scrubber may be treated and subsequently recycled, sold, or used to manufacture HCl. All weak brine solutions may be recycled to the process after extraction elimination of impurities. In the diaphragm cell process, the use of dimensionally stable anodes will eliminate the lead discharge.

(9) Many comments referred to cooling water, boiler blowdown waste water problems, and water supply waste water problems. These are to be dealt with later as a separate category. Any cooling water that picks up process related pollutants from leaks becomes process waste water. It is the responsibility of the plant to monitor cooling water streams for leaks, and to treat contaminated cooling water to the standards established for process waste water discharges.

(10) It has been pointed out by commenters that the economic impact analysis considered fully only 16 of the chemical commodities subject to this regulation. Because the remaining chemicals are largely interdependent with chemicals considered fully in the analyses or because the projected cost increase was a small percentage of the selling price, these chemicals did not appear to require a rigorous economic impact analysis. However, because of this comment, EPA is undertaking a further analysis of the economic impact of these regulations on the production of calcium chloride, sodium bicarbonate, sodium carbonate, sodium chloride, sodium metal, sodium silicate, sodium sulfite, and potassium sulfate. EPA requests comments and specific data on the possible economic impact of this proposed regulation on these chemicals.

Interested persons may participate in this rulemaking by submitting written comments in triplicate to the EPA Information Center, Environmental Protection Agency, Washington, D.C. 20460, Attention: Mr. Philip B. Wisman. Comments on all aspects of the proposed regulations are solicited. In the event comments are in the nature of criticisms as to the adequacy of data which is available, or which may be relied upon by the Agency, comments should identify and, if possible, provide any additional data which may be available and should indicate why such data is essential to the development of the regulations. In the event comments address the approach taken by the agency in establishing an effluent limitation guideline or standard of performance, EPA solicits suggestions as to what alternative approach should be taken and why and how this alternative better satisfies the detailed requirements of sections 301, 304(b), 306 and 307 of the Act.

A copy of all public comments will be available for inspection and copying at the EPA Information Center, Room 227, West Tower, Waterside Mall, 401 M Street, SW., Washington, D.C. A copy of preliminary draft contractor reports, the Development Document and economic study referred to above, and certain supplementary materials supporting the study of the industry concerned will also be maintained at this location for public review and copying. The EPA information regulation,

40 CFR Part 2, provides that a reasonable fee may be charged for copying.

All comments received within thirty days of publication of this notice in the FEDERAL REGISTER will be considered. Steps previously taken by the Environmental Protection Agency to facilitate public response within this time period are outlined in the advance notice concerning public review procedures published on August 6, 1973 (38 FR 21202).

Dated October 1, 1973.

RUSSELL E. TRAIN,
Administrator.

PART 415—EFFLUENT LIMITATIONS GUIDELINES FOR EXISTING SOURCES AND STANDARDS OF PERFORMANCE AND PRETREATMENT STANDARDS FOR NEW SOURCES FOR THE INORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY

Subpart A—Aluminum Chloride Production Subcategory

Subpart B—Aluminum Sulfate Production Subcategory

Subpart C—Calcium Carbide Production Subcategory

Subpart D—Calcium Chloride Production Subcategory

Subpart E—Calcium Oxide and Hydroxide Production Subcategory

Subpart F—Chlorine and Sodium or Potassium Hydroxide Production Subcategory

Subpart G—Hydrochloric Acid Production Subcategory

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Subpart I—Hydrogen Peroxide Production Subcategory

Subpart J—Nitric Acid Production Subcategory

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Subpart K—Potassium Metal Production Subcategory

415.110 Applicability; description of potassium metal production subcategory.

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415.112 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

415.113 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

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415.115 Pretreatment standards for new sources.

Subpart L—Potassium Dichromate Production Subcategory

415.120 Applicability; description of potassium dichromate production subcategory.

415.121 Specialized definitions.

415.122 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

415.123 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.124 Standards of performance for new sources.

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Subpart M—Potassium Sulfate Production Subcategory

415.130 Applicability; description of potassium sulfate production subcategory.

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415.131 Specialized definitions.

415.132 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

415.133 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.134 Standards of performance for new sources.

415.135 Pretreatment standards for new sources.

[4870] **Subpart N—Sodium Bicarbonate Production Subcategory**

415.140 Applicability; description of sodium bicarbonate production subcategory.

415.141 Specialized definitions.

415.142 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

415.143 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.144 Standards of performance for new sources.

415.145 Pretreatment standards for new sources.

Subpart O—Sodium Carbonate Production Subcategory

415.150 Applicability; description of sodium carbonate production subcategory.

415.151 Specialized definitions.

415.152 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Subpart P—Sodium Chloride Production Subcategory

Subpart Q—Sodium Dichromate and Sodium Sulfate Production Subcategory

Subpart R—Sodium Metal Production Subcategory

Subpart S—Sodium Silicate Production Subcategory

Subpart T—Sodium Sulfite Production Subcategory

Subpart U—Sulfuric Acid Production Subcategory

Subpart V—Titanium Dioxide Production Subcategory

Subpart A—Aluminum Chloride Production Subcategory

§ 415.10 Applicability; description of aluminum chloride production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of aluminum chloride.

§ 415.11 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of aluminum chloride.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

§ 415.12 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged

after application of the best practicable technology currently available by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.13 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.14 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through ap- [4871] plication of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.15 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the act, for a source within the aluminum chloride subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131, of this title, pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.14, Part 415: *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart B—Aluminum Sulfate Production Subcategory

§ 415.20 Applicability; description of aluminum sulfate production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of aluminum chloride.

§ 415.21 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of aluminum sulfate.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

§ 415.22 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently available by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.23 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.24 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.25 Pretreatment standards for sources.

The pretreatment standards under section 307(c) of the Act, for a source within the aluminum sulfate subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.24, Part 415 provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart C—Calcium Carbide Production Subcategory

§ 415.30 Applicability; description of calcium carbide production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of calcium carbide.

§ 415.31 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of calcium carbide.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

§ 415.32 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently available by a point source subject to the provisions of this subpart: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.33 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged

after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.34 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.35 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the calcium carbide subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128, of this title except that for the purposes of this section, § 128.133, shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131, of this title the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.34, Part 415 provided that, if the publicly owned treatment works which receives the pollutants is com- [4872] mitted, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart D—Calcium Chloride Production Subcategory

§ 415.40 Applicability; description of calcium chloride production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of calcium chloride by the brine extraction process.

§ 415.41 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of calcium chloride.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

(c) The term "product" shall mean calcium chloride.

(d) The following abbreviations shall have the following meanings: (1) kg shall mean kilogram(s); (2) kkg shall mean 1,000 kilograms; (3) lb shall mean pound(s); and (4) TSS shall mean total suspended nonfilterable solids.

§ 415.42 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently available by a point source subject to the provisions of this subpart:

Effluent Characteristic	*Effluent Limitation*
TSS	Maximum for any one day 0.016 kg/kkg product (0.016 lb/1,000 lb).

Effluent Characteristic	*Effluent Limitation*
pH	Maximum average of daily values for any period of thirty consecutive days 0.0082 kg/kkg of product (0.0082 lb/1,000 lb), within the range 6.0 to 9.0.

§ 415.43 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.44 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.45 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the calcium chloride subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title, shall be amended to read as follows: "In addition to the prohibitions

set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in section 415.44, Part 415 provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart E—Calcium Oxide and Hydroxide Production Subcategory

§ 415.50 Applicability; description of calcium oxide and hydroxide production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of calcium oxide and hydroxide.

§ 415.51 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of lime.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

§ 415.52 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently available by a point source subject to the provisions of this

subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.53 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.54 Standards of performance for new sources.

The following limitations consitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.55 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the calcium oxide and hydroxide subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title except that for the purposes of this section, § 128.133 of this title shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.54, Part 415 provided that, if the publicly owned treat-

ment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart F—Chlorine and Sodium or Potassium Hydroxide Production Subcategory

§ 415.60 Applicability; description of the chlorine and sodium or potassium hydroxide production category.

The provisions of this subpart are applicable to discharges resulting from the production of chlorine and sodium or po-
[4873] tassium hydroxide in chlor-alkali plants by the mercury cell process or by the diaphragm cell process.

§ 415.61 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of chlorine and sodium or potassium hydroxide.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

(c) The term "product" means chlorine.

(d) The following abbreviation shall have the following meanings: (1) kg shall mean kilogram(s); (2) kkg shall mean 1000 kilograms; (3) lb shall mean pound(s); (4) TSS shall mean total suspended nonfilterable solids.

§ 415.62 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

(a) The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be

discharged from the production of chlorine, sodium or potassium hydroxide by the mercury cell process after application of the best practicable technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
TSS	Maximum for any one day 0.64 kg/kkg product (0.64 lb/1,000 lb). Maximum average of daily values for any period of thirty consecutive days 0.32 kg/kkg of product (0.32 lb/1,000 lb).
Total Dissolved Mercury.	Maximum for any one day 0.00014 kg/kkg product (0.00014 lb/1,000 lb). Maximum average of daily values for any period of thirty consecutive days 0.00007 kg/kkg of product (0.00007 lb/1,000 lb).
pH	Within the range 6.0 to 9.0.

(b) The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged from the production of chlorine, sodium or potassium hydroxide by the diaphragm cell process after application of best practicable control technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitations*
TSS	Maximum for any one day 0.17 kg/kkg product (0.17 lb/1,000 lb). Maximum average of daily values for any period of thirty consecutive days 0.083 kg/kkg of product (0.083 lb/1,000 lb).
Total Dissolved Lead.	Maximum for any one day 0.005 kg/kkg product (0.005 lb/1,000 lb). Maximum average of daily values for any period of thirty consecutive days 0.0025 kg/kkg of product (0.0025 lb/1,000 lb).
pH	Within the range 6.0 to 9.0.

§ 415.63 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.64 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.65 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the chlorine and sodium or potassium hydroxide subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title except that for the purposes of this section, § 128.133 of this title shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.64, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard appli-

cable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart G—Hydrochloric Acid Production Subcategory

§ 415.70 Applicability; description of hydrochloric acid production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of hydrochloric acid by direct reaction of chlorine with hydrogen.

§ 415.71 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of hydrochloric acid.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

§ 415.72 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently available by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.73 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.74 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.75 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the hydrochloric acid subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133, 40 CFR shall be amended to read as follows: "In addition to the prohibitions set forth in [4874] § 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.74, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart H—Hydrofluoric Acid Production Subcategory

§ 715.80 Applicability; description of hydrofluoric acid production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of hydrofluoric acid.

§ 415.81 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of hydrofluoric acid.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

§ 415.82 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently available by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.83 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.84 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control

technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.85 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the hydrofluoric acid subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title, shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.84, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart I—Hydrogen Peroxide Production Subcategory

§ 415.90 Applicability; description of hydrogen peroxide production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of hydrogen peroxide by the electrolytic process and by the oxidation of alkyl hydroanthraquinones.

§ 415.91 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waster water" shall mean any water which, during the manufacturing process, comes into direct

contact with any raw material, intermediate product, by-product or product used in or resulting from the production of hydrogen peroxide.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

(c) The term "product" shall mean hydrogen peroxide.

(d) The following abbreviations shall have the following meanings: (1) kg shall mean kilogram(s); (2) kkg shall mean 1,000 kilograms; (3) lb shall mean pound(s); (4) TSS shall mean total suspended nonfilterable solids; (5) other dissolved metals shall mean iron and platinum; and (6) TCC shall mean total organic carbon.

§ 415.92 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

(a) The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged from the production of hydrogen peroxide by the oxidation process after application of the best practicable technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitations*
TSS	Maximum for any one day 0.8 kg/kkg product (0.8 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.4 kg/kkg of product (0.4 lb/1,000 lb).
TOC	Maximum for any one day 0.44 kg/kgg product (0.44 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.22 kg/kkg of product (0.22 lb/1,000 lb).
pH	Within the range 6.0 to 9.0.

(b) The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged from the production of hydrogen peroxide by the electrolytic process after application of best practicable control technology currently available by a point source subject to these provisions of this subpart:

Effluent characteristic	*Effluent limitations*
TSS	Maximum for one day 0.005 kg/kkg product (0.005 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.0025 kg/kkg product (0.0025 lb/1,000 lb).
Total Dissolved Cyanide.	Maximum for one day 0.0004 kg/kkg product (0.0004 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.0002 kg/kkg product (0.0002 lb/1,000 lb).
Total Other Dissolved Metals.	Maximum for one day 0.004 kg/kkg product (0.004 kg/kkg).
	Maximum average of daily values for any period of thirty consecutive days 0.0002 kg/kkg product (0.0002 lb/1,000 lb).
pH	Within the range 6.0 to 9.0.

§ 415.93 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.94 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, [4875] operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigate waters.

§ 415.95 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the hydrogen peroxide subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.94, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart J—Nitric Acid Production Subcategory

§ 415.100 Applicability; description of nitric acid production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of nitric acid by the catalytic oxidation of ammonia.

§ 415.101 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of nitric acid.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

§ 415.102 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently available by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.103 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.104 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control

technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.105 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the nitric acid subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128, of this title except that for the purposes of this section, § 128.133 of this title, 40 CFR shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.104, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart K—Potassium Metal Production Subcategory

§ 415.110 Applicability; description of potassium metal production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of potassium metal.

§ 415.111 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-

product or product used in or resulting from the production of potassium.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

§ 415.112 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently available by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.113 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.114 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.115 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the potassium subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133, of this title, shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.114, provided that, if [4876] the publicly owned treatment works which receives the pollutants is committed in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart L—Potassium Dichromate Production Subcategory

§ 415.120 Applicability; description of potassium dichromate production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of potassium dichromate.

§ 415.121 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of potassium dichromate.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

§ 415.122 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged, after application of the best practicable technology currently available by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.123 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.124 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.125 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the potassium dichromate subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters),

shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title, 40 CFR shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.124, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart M—Potassium Sulfate Production Subcategory

§ 415.130 Applicability; description of potassium sulfate production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of potassium sulfate.

§ 415.131 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of potassium sulfate.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

§ 415.132 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently available by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.133 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.134 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.135 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the potassium sulfate subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title, 40 CFR shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall

be the standard of performance for new sources specified in § 415.134, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

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Subpart N—Sodium Bicarbonate Production Subcategory

§ 415.140 Applicability; description of sodium bicarbonate production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of sodium bicarbonate.

§ 415.141 Specialized definitions.

For the purposes of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of sodium bicarbonate.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

[4877] **§ 415.142 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.**

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently available by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.143 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.144 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.145 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the sodium bicarbonate subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title, shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.144, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant,

the pret·eatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant.

Subpart O—Sodium Carbonate Production Subcategory

§ 415.150 Applicability; description of sodium carbonate production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of sodium carbonate by the Solvay process.

§ 415.151 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product, or product used in or resulting from the production of sodium carbonate.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

(c) The term "product" shall mean sodium carbonate.

(d) The following abbreviations shall have the following meanings: (1) kg shall mean kilogram(s); (2) kkg shall mean 1,000 kilograms; (3) lb shall mean pound(s); (4) TSS shall mean total suspended nonfilterable solids.

§ 415.152 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently

available by a point source subject to the provisions of this subpart:

Effluent Characteristic	*Effluent Limitation*
TSS	Maximum for any one day 0.34 kg/kkg product (0.34 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.17 kg/kkg of product (0.17 lb/1,000 lb).
pH	within the range 6.0 to 9.0.

§ 415.153 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
TSS	Maximum for any one day 0.2 kg/kkg product (0.2 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.1 kg/kkg of product (0.1 lb./1,000 lb).
pH	Within the range 6.0 to 9.0.

§ 415.154 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no dis-

charge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.155 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the sodium carbonate subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128, of this title, except that for the purposes of this section, § 128.133 of this title, 40 CFR shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.154, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart P—Sodium Chloride Production Subcategory

§ 415.160 Applicability; description of sodium chloride production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of sodium chloride by the solution brine-mining process and by the solar evaporation process.

§ 415.161 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-

product or product used in or resulting from the production of sodium chloride.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

(c) The term "product" shall mean sodium chloride.

(d) The following abbreviations shall have the following meanings: (1) kg shall mean kilogram(s); (2) kkg shall [4878] mean 1000 kilograms, (3) lb shall mean pound(s); and (4) TSS shall mean total suspended nonfilterable solids.

§ 415.162 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

(a) The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged from the production of sodium chloride by the solar evaporation process after application of the best practicable technology currently available by a point source subject to the provisions of this subpart: there shall be no discharge of process waste water pollutants to navigable waters.

(b) The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged from the production of sodium chloride by the brine-mining process after application of the best practicable technology currently available by a point source subject to the provisions of this subpart:

Effluent Characteristic	*Effluent Limitation*
TSS	Maximum for any one day 0.30 kg/kkg product (0.30 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.15 kg/kkg product (0.15 lb/1,000 lb).
pH	Within the range 6.0 to 9.0.

§ 415.163 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.164 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.165 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the sodium chloride subcategory, which is an industrial user of publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128, of this title except that for the purposes of this section, § 128.133 of this title, 40 CFR shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.164, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart Q—Sodium Dichromate and Sodium Sulfate Production Subcategory

§ 415.170. Applicability; description of sodium dichromate and sodium sulfate production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of sodium dichromate and by-product sodium sulfate.

§ 415.171 Specialized definitions.

For the purpose of this subpart:

(a) the term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of sodium dichromate/sodium sulfate.

(b) the term "process waste water pollutants" shall mean any pollutants present in the process waste water.

(c) the term "product" shall mean sodium [d]ichromate.

(d) the following abbreviations shall have the following meanings: (1) kg shall mean kilogram(s); (2) kkg shall mean 1000 kilograms; (3) lb shall mean pound(s); (4) TSS shall mean total suspended nonfilterable solids.

§ 415.172 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently

available by a point source subject to the provisions of this subpart:

Effluent Characteristic	*Effluent Limitation*
TSS	Maximum for any one day 0.44 kg/kkg product (0.44 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.22 kg/kkg of product (0.22 lb/1,000 lb).
Total Chromium.	Maximum for any one day 0.0088 kg/kkg product (0.0088 lb/1,000 lb).
Hexavalent Chromium.	Maximum average of daily values for any period of thirty consecutive days 0.0044 kg/kkg of product (0.0044 lb/1,000 lb).
	Maximum for any one day 0.0018 kg/kkg product (0.0018 lb/1,000 lb).
pH	Maximum average of daily values for any period of thirty consecutive days 0.0009 kg/kkg of product (0.0009 lb/1,000 lb). within the range 6.0 to 9.0.

§ 415.173 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.174 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged

reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.175 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the sodium dichromate and sodium sulfate subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title, except that for the purposes of this section, § 128.133 of this title, 40 CFR shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.174, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment stand- [4879] ard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart R—Sodium Metal Production Subcategory

§ 415.180 Applicability; description of sodium metal production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of sodium metal by electroylsis.

§ 415.181 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of sodium.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

(c) The term "product" shall mean sodium metal.

(d) The following abbreviations shall have the following meanings: (1) kg shall mean kilogram(s); (2) kkg shall mean 1,000 kilograms; (3) lb shall mean pound(s); and (4) TSS shall mean total suspended nonfilterable solids.

§ 415.182 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent Limitation*
TSS	Maximum for any one day 0.46 kg/kkg product (0.46 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.23 kg/kkg of product (0.23 lb/1,000 lb).
pH	Within the range 6.0 to 9.0.

§ 415.183 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.184 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of affluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.185 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the sodium subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128, of this title except that for the purposes of this section, § 128.33 of this title, 40 CFR shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.184, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant,

the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart S—Sodium Silicate Production Subcategory

§ 415.190 Applicability; description of sodium silicate production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of sodium silicate.

§ 415.191 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of sodium silicate.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

§ 415.192 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently available by a point source subject to the provisions of this subject: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.193 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged

after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.194 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.195 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the sodium silicate subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigate waters), shall be the standard set forth in Part 128, of this title, except that for the purposes of this section, § 128.133 of this title, 40 CFR shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.194, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart T—Sodium Sulfite Production Subcategory

§ 415.200 Applicability; description of sodium sulfate production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of sodium sulfite from the reaction of sulfur dioxide with soda ash.

§ 415.201 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into di- [4880] rect contact with any raw material, intermediate product, by-product or product used in or resulting from the production of sodium sulfite.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

(c) The term "product" shall mean sodium sulfite.

(d) The following abbreviations shall have the following meanings: (1) kg shall mean kilogram(s); (2) kkg shall mean 1000 kilograms; (3) lb shall mean pound(s); (4) TSS shall mean total suspended nonfilterable solids and (5) COD shall mean chemical oxygen demand.

§ 415.202 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent Limitation*
TSS	Maximum for any one day 0.032 kg/kkg product (0.032 lb/1,000 lb).

Effluent characteristic	*Effluent Limitation*
	Maximum average of daily values for any period of thirty consecutive days .016 kg/kkg product (0.16 lb/1,000 lb).
COD	Maximum for any one day 3.4 kg/kkg product (3.4 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 1.7 kg/kkg product (1.7 lb/1,000 lb).
pH	Within the range 6.0 to 9.9 [sic].

§ 415.203 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.204 Standards of performance for new source.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.205 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the sodium sulfite subcategory, which is an

industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128, of this title, except that for the purposes of this section, § 128.133 of this title, 40 CFR shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.204, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart U—Sulfuric Acid Production Subcategory

§ 415.210 Applicability; description of sulfuric acid production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of sulfuric acid by the catalytic oxidation of sulfur dioxide in single or double absorption plants.

§ 415.211 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of sulfuric acid.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

§ 415.212 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently available by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.213 Effluent limitations guideline representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best available technology economically achievable by a point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.214 Standards of performance for new sources.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart: There shall be no discharge of process waste water pollutants to navigable waters.

§ 415.215 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the sulfuric acid subcategory, which is an industrial user of a publicly owned treatment works (and which

would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standards set forth in Part 128, 40 CFR, except that for the purposes of this section, § 128.133 shall be amended to read as follows: "In addition to the prohibitions set forth in section 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.214, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

Subpart V—Titanium Dioxide Production Subcategory

§ 415.220 Applicability; description of titanium dioxide production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of titanium dioxide by the sulfate process and by the chloride process.

§ 415.221 Specialized definitions.

For the purpose of this subpart:

(a) The term "process waste water" shall mean any water which, during the manufacturing process, comes into direct contact with any raw material, intermediate product, by-product or product used in or resulting from the production of titanium dioxide.

(b) The term "process waste water pollutants" shall mean any pollutants present in the process waste water.

(c) The term "product" shall mean titanium dioxide.

(d) The term "other dissolved metals" shall mean vanadium (as V_2O_5), aluminum (as Al_2O_3), silicon (as SiO_2), chromium

(as Cr_2O_3), magnesium (as MgO), [4881] neodymium (as Nd_2O_3) and zirconium (as ZrO_2).

(e) The following abbreviations shall have the following meaning: (1) kg shall mean kilogram(s); (2) kkg shall mean 1000 kilograms; (3) lb shall mean pound(s); (4) TSS shall mean total suspended nonfilterable solids.

§ 415.222* Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

(a) The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged from the production of titanium dioxide by the chloride process after application of the best practicable technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
TSS	Maximum for any one day 4.4 kg/kkg product (4.4 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 2.2 kg/kkg of product (2.2 lb/1,000 lb).
Total dissolved iron.	Maximum for any one day 0.072 kg/kkg product (0.072 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.036 kg/kkg of product (0.036 lb/1,000 lb).
Total dissolved lead.	Maximum for any one day 0.028 kg/kkg product 0.028 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.014 kg/kkg of product (0.014 lb/1,000 lb).
Total other dissolved metals.	Maximum for any one day 0.03 kg/kkg product (0.03 lb/1,000 lb).

Effluent characteristic	*Effluent limitation*
pH	Within the range 6.0 to 9.0.
	Maximum average of daily values for any period of thirty consecutive days 0.015 kg/kkg of product (0.015 lb/1,000 lb).

(b) The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged from the production of titanium dioxide by the sulfate process after application of best practicable control technology currently available by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
TSS	Maximum for any one day 5.0 kg/kkg product (5.0 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 2.5 kg/kkg of product (2.5 lb/1,000 lb).
Magnesium (as MgO).	Maximum for any one day 2.0 kg/kkg product (2.0 lb/1,000 lb).
Cobalt (as CoO).	Maximum for any one day 0.1 kg/kkg product (0.1 lb/1,000 lb).
Silicon (as SiO_2).	Maximum for any one day 0.1 kg/kkg product (0.1 lb/1,000 lb).
Chrominum (as Cr_2O_3).	Maximum for any one day 0.1 kg/kkg product (0.1 lb/1,000 lb).
Aluminum (as Al_2O_3).	Maximum for any one day 0.1 kg/kkg product (0.1 lb/1,000 lb).
Iron (as (as Fe_2O_3).	Maximum for any one day 0.1 kg/kkg product (0.1 lb/1,000 lb).
Vanadium (as V_2O_5).	Maximum for any one day 3.2 kg/kkg product (3.2 lb/1,000 lb).
pH	Within the range 6.0 to 9.0.

§ 415.223 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

(a) The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged from production of titanium dioxide by the chloride process after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent Characteristic	*Effluent Limitation*
TSS	Maximum for any one day 2.6 kg/kkg product (2.6 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 1.3 kg/kkg of product (1.3 lb/1,000 lb).
Total dissolved iron.	Maximum for any one day 0.072 kg/kkg product (0.072 lb/1,000 lb).
	Maximum averages of daily values for any period of thirty consecutive days 0.036 kg/kkg of product (0.036 lb/1,000 lb).
Total dissolved lead.	Maximum for any one day 0.028 kg/kkg product (0.028 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.014 kg/kkg of product (0.014 lb/1,000 lb).
Total other dissolved metals.	Maximum for any one day 0.03 kg/kkg product (0.03 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.015 kg/kkg of product (0.015 lb/1,000 lb).
pH	Within the range 6.0 to 9.0.

(b) The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be dis-

charged from the production of titanium dioxide by the sulfate process after application of the best available technology economically achievable by a point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
TSS	Maximum for any one day 3.0 kg/kkg product (3.0 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 1.5 kg/kkg of product (1.5 lb/1,000 lb).
Magnesium (as MgO)	Maximum for any one day 2.0 kg/kkg product (2.0 lb/1,000 lb).
Cobalt (as CoO)	Maximum for any one day 0.1 kg/kkg product (0.1 lb/1,000 lb).
Silicon (as SiO_2)	Maximum for any one day 0.1 kg/kkg product (0.1 lb/1,000 lb).
Chromium (as Cr_2O_3)	Maximum for any one day 0.1 kg/kkg product (0.1 lb/1,000 lb).
Aluminum (as Al_2O_3)	Maximum for any one day 0.1 kg/kkg product (0.1 lb/1,000 lb).
Iron (as Fe_2O_3)	Maximum for any one day 0.1 kg/kkg product (0.1 lb/1,000 lb).
Vanadium (as V_2O_5)	Maximum for any one day 3.2 kg/kkg product (3.2 lb/1,000 lb).
pH	Within the range 6.0 to 9.0.

§ 415.224 Standards of performance for new sources.

(a) The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable from the production of titanium dioxide by the chloride process through application of the best available

demonstrated control technology, processes, operating methods, or other alternatives, including where practicable, a standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitation*
TSS	Maximum for any one day 2.6 kg/kkg product (2.6 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 1.3 kg/kkg of product (1.3 lb/1,000 lb).
Total dissolved iron.	Maximum for any one day 0.072 kg/kkg product (0.072 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.036 kg/kkg of product (0.036 lb/1,000 lb).
Total dissolved lead.	Maximum for any one day 0.028 kg/kkg product (0.028 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.014 kg/kkg of product (0.014 lb/1,000 lb).
Total other dissolved metals.	Maximum for any one day 0.03 kg/kkg product (0.03 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 0.015 kg/kkg of product (0.015 lb/1,000 lb).
pH	Within the range 6.0 to 9.0.

(b) The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged reflecting the greatest degree of effluent reduction achievable from the production of titanium dioxide by the sulfate process through application of the best available demonstrated control technology processes, operating methods, [4882] or other alternatives, including, where practicable, a

standard permitting no discharge of pollutants by a new point source subject to the provisions of this subpart:

Effluent characteristic	*Effluent limitations*
TSS	Maximum for any one day 3.0 kg/kkg product (3.0 lb/1,000 lb).
	Maximum average of daily values for any period of thirty consecutive days 1.5 kg/kkg of product (1.5 lb/1,000 lb).
Magnesium (as MgO).	Maximum for any one day 2.0 kg/kkg product (2.0 lb/1,000 lb).
Cobalt (as CoO).	Maximum for any one day 0.1 kg/kkg product (0.1 lb/1,000 lb).
Silicon (as SiO_2).	Maximum for any one day 1.0 kg/kkg product (0.1 lb/1,000 lb).
Chromium (as Cr_2O_3).	Maximum for any one day 1.0 kg/kkg product (1.0 lb/1,000 lb).
Aluminum (as Al_2O_3).	Maximum for any one day 1.0 kg/kkg product (1.0 lb/1,000 lb).
Iron (as Fe_2O_3).	Maximum for any one day 1.0 kg/kkg product (1.0 lb/1,000 lb).
Vanadium (as V_2O_5).	Maximum for any one day 3.2 kg/kkg product (3.2 lb/1,000 lb).

§ 415.225 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act, for a source within the titanium dioxide production subcategory, which is an industrial user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to navigable waters), shall be the standard set forth in Part 128 of this title except that for the purposes of this section, § 128.133 of this title shall be amended to read as follows: "In addition to the prohibitions set forth in § 128.131 of this title, the pretreatment standard for incompatible pollutants introduced into a publicly

owned treatment works by a major contributing industry shall be the standard of performance for new sources specified in § 415.224, provided that, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall be correspondingly reduced for that pollutant."

[FR Doc. 73-21230 Filed 10-10-73; 8:45 am]

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[COMMENTS ON PROPOSED RULES—NL INDUSTRIES.]

[4918] TITANIUM PIGMENT OPERATIONS

GLENN A. WILSON
Group Vice President

REGISTERED MAIL
RETURN RECEIPT REQUESTED

November 7, 1973

U.S. Environmental Protection Agency
Information Center
Washington, D. C. 20460

Attention: Mr. Philip B. Wisman

Gentlemen:

Please accept our comments in response to the Proposed Rules, published in the Federal Register October 11, 1973, establishing Effluent Limitations, Guidelines and Standards of Performance and Pretreatment for Inorganic Chemicals, Manufacturing Point Sources Category. The comments are made with reference to those sections of the Guidelines and other

reference Documents pertaining to the production of titanium dioxide and are detailed in the attached Exhibit A.

We believe that if the proposed Guidelines are promulgated in the present form they will have a profound adverse impact on the national economy, the titanium dioxide pigment industry, and N L Industries, Inc., Titanium Pigment Division. Our analysis of the Guidelines and supplementary Documents shows many seeming inaccuracies, false assumptions and erroneous conclusions. We respectfully urge a complete re-evaluation of these Guidelines before they are promulgated. In your re-evaluation we invite your consideration to the points set forth in the attached Exhibit A.

Very truly yours,

GLENN A. WILSON
Group Vice President

[4919] **EXHIBIT A**

**N L INDUSTRIES, INC.
TITANIUM PIGMENT DIVISION**

Comments on Proposed Effluent Guidelines

These comments present the response of N L Industries, Inc., Titanium Pigment Division on the Proposed Effluent Limitations Guidelines of Reference (2), using the Development Document of Reference (1) and the Economic Analysis of Reference (3), as those Guidelines relate to the production of titanium dioxide (TiO_2).

Reference Documents

(1) "Development Document for Proposed Effluent Guidelines and New Source Performance Standards for the Major Inorganic Products Segment of the Inorganic Chemicals Manufacturing Point Source Category," United States Environmental Protection Agency, August 1973.

(2) "Effluent Limitations Guidelines and Standards of Performance and Pretreatment," Environmental Protection Agency, Federal Register, October 11, 1973.

(3) "Economic Analyses of Proposed Effluent Guidelines—Inorganic Chemicals, Alkali and Chlorine Industries (Major Products)," Contract No. 68-01-1541, August 1973, Office of Planning and Evaluation, Environmental Protection Agency, Washington, D. C.

SUMMARY

1. The required technology to achieve the Proposed Guidelines has not been demonstrated in the titanium dioxide production industry.

2. The total impact of the Proposed Guidelines on the environment, on land use policy, the national energy crisis, and the cost and cost benefits have been inadequately considered and inaccurately assessed.

3. The treatment methods and costs have been understated for the degree of control specified in the Guidelines.

[4920] 4. Promulgation of these Guidelines would produce severe inequities and would be the decisive competitive factor for the entire titanium dioxide industry. This is not the intent of the law (PL-92-500).

5. Administration of the Proposed Guidelines would be extremely difficult.

DISCUSSION

Land Use Policy

In order to achieve the extremely low levels of materials in the titanium dioxide plant effluent streams as listed in the Proposed Guidelines, lime neutralization of process effluents would be required, followed by separation of the resulting calcium sulfate-metal hydroxide from effluent waste water, and disposal of the sludge and land filling. This is the major treatment technology advocated by the contractor in the development Document. It is believed this land filling is unfeasible, uneconomical, and violates an environmental axiom expounded in the Development Document (page 11) ". . . that exemplary sites are not those which are exchanging one form of pollution for another of the same or greater magnitude." The technology

advocated by the contractor trades a reduction in liquid emission for a solid waste disposal problem and a possible conflict with Local, State and Federal regulations.

The availability of land for such land filling is a major problem. Land is not available at many plant locations, necessitating hauling to distant fill sites. At one N L plant use of neutralization technology would mean transporting approximately 25,000 tons per day of wet sludge to a site many miles away. This again assumes that a satisfactory site could be found. Furthermore, the contractor states there is a problem of solubility ". . . slightly soluble material such as calcium sulfate may be handled this way (although not necessarily with complete justification)." (Development Document, Page 342) This means waterproof containment must be used. Since the evaporation-rainfall balance is unfavorable at titanium dioxide plant locations, the gypsum cake would need to be containerized in some sort of plastic envelope. The cost for this will be discussed in a later section, but transport and disposal of 25,000 tons per day of waste solids by this means, using the example of the previously mentioned N L plant, involves a land-volume in excess of 400 acre-feet per year.

[4921] The Development Document lists the various factors considered for best practical technology and best available technology (Pages 353 and 369). Land availability or land use policy are not listed and appear not to have been considered. Certainly these are major factors when considering either the best practical or best available technology for the reduction of liquid effluents from a titanium dioxide plant.

Energy Consumption

An important factor in considering the treatment technologies advocated in the Development Document is their energy consumption. The contractor has assumed energy costs and availability which seem to disregard the predictions for the period covered by the Guidelines. Neutralization processes require energy for grinding and mixing of reactants, and for filtering and transport of sludges to a landfill site. Energy is required for the production of lime or other neutralizing

agents. Other processes discussed by the contractor, such as demineralization, multi-effect evaporation, and acid concentration all have their own energy demands, some of them very high. We have estimated, for example, that one acid recovery process requires about one ton of fuel oil in order to recover one ton of sulfur contained in the concentrated acid. This consumption of an increasingly scarce resource, oil, to recover one ton of widely available and inexpensive sulfur is not in the national interest.

Guideline Flexibility

The Proposed Guidelines are blanket rules which fail to take into account unique features at individual existing plants. Some plants have no land available for landfilling; indeed, some may not have the land necessary for the construction of the treatment facilities that would be required. Other factors not taken into account are the age, location, water supply, and product mix of the plants. For example, one of the N L plants produces nonpigmentary TiO_2. This is a unique product, for the glass and ceramic industries. The process yields dilute effluents that [4922] would be uniquely expensive to treat. Further, the existing process equipment at this plant yields dilute effluents not suitable for acid recovery. The best practical technology is not the same for all plants because of limitations imposed by the unique and peculiar factors of each plant.

The Guidelines should be flexible with consideration given to the numerous plant by plant exceptions to the "model plant" used by the contractor.

Lack of Demonstrated Control Technology

The technology required to achieve the low Guideline levels has not been demonstrated on TiO_2 plant effluent streams. The contractor has assumed the successful transfer of technology from other processes, an assumption that remains to be proven viable. The Development Document states (Abstract, Page iii, 2nd paragraph): "The standards of performance and pretreatment standards for new sources contained herein set forth the degree of effluent reduction which is achievable through the

application of the best available demonstrated control technology, . . ." No control technology has been demonstrated that would enable TiO_2 manufacturing plants to meet the Proposed Limitations, Guidelines, and Standards of Performance published October 11, 1973.

Costs and Cost Benefit

Costs are one of the most important, and one of the most difficult factors to be evaluated, yet the technologies must be "economically achievable." We believe the costs in the Development Document to be low by a factor of two to four. More specifically, the costs for neutralization at an N L sulfate plant were recently estimated by a consulting organization at $142/ton of product as compared to the EPA contractor's estimate of $82/ton of product. Even at this cost, the treatment would not meet the Proposed Guideline limits.

[4923] We feel the costs developed by the EPA contractor are low. In examining the Summary Cost Tables 68 and 69 (Pages 308, 309 of the Development Document), no separate cost for solids disposal is listed. Possibly, it is included in the "Operating and Maintenance Costs" category. If so, it appears that a very low solids disposal cost was used. In Table 68, for example, under Category "C," we find $2,000,000 for all of operating and maintenance. Maintenance alone on a $10,000,000 facility would cost about $500,000 per year. It appears that a solids disposal cost of about $1/ton was used, which would amount to about $730,000 per year. However, if no land is available at the plant site, and considering the need for containerization of the solids, as described earlier, the disposal cost would be much higher. The Development Document states (Page 344) that waterproof containment with plastic envelope sealing would cost $4/ton. Adding transportation and dump site acquisition and maintenance costs, the cost for solids disposal could easily be $5-$10/ton. For the case "C" of Table 68, the solids disposal cost would then be $3,000,000 to $6,500,000 per year *higher* than estimated by the contractor. These costs are $150 to $231 per ton of product as compared with the EPA contractor cost estimate of $82 per ton.

On the subject of economics the contractor states, in the Development Document (Page 238): "The sulfate process for producing titanium dioxide has the greatest raw waste load of all the processes of this study. This is not because control and treatment technology is lacking, but rather because it is more economical not to apply it." The second sentence is a statement of opinion not supported by any data, and is an unwarranted conclusion. There are important factors other than economics that have a bearing on whether control and treatment technology is either available or feasible. As has been discussed, other factors of importance are availability of land for solids disposal, land use policy, energy consumption, whether or not present disposal practices are harmful, and whether the costs to be borne ultimately by the consumer are justified by the benefits obtained. By drawing this conclusion the contractor attempts to prove by rhetoric what was not proven regarding the technological feasibility or the cost benefit of the Proposed Guidelines.

[4924] Fundamental questions that must be asked and answered are: "What harm is being done now?" and "What benefit is derived from the increased capital and manufacturing expenditures of millions of dollars?" The law requires that there be cost benefits. The contractor states in the Development Document in regard to the effluent limitations which must be achieved by July 1, 1977 (Page 353, 3rd paragraph): "Consideration was also given to:

a. The total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application."

We find no analysis or discussion of such "benefits" in the report.

Pricing, Competition

The Economic Analysis by a second EPA contractor, using costs derived by the first contractor, studies the questions of pricing, plant shutdowns, and foreign competition. He indicates that the estimated required price increase to cover the

proposed treatment costs would force some, but not many, plant shutdowns, and foreign competition would not increase unduly. However, if, as we contend, the estimates of treatment costs are much too low, then the required price increases would have different consequences. It is believed widespread plant shutdowns would be forced, and imports of TiO_2 would increase drastically. This would aggravate the balance of payment problems, and is tantamount to exporting jobs. This opinion is supported by the contractor who states in the Economic Analysis (Page 110): ". . . that if costs are in fact understated by a factor of four, the impact on the TiO_2 industry will be severe and substantial plant shutdowns could be expected especially among sulfate producers." Based on the cost estimates of our consultant, the situation described in the above quote is a very real possibility if the Proposed Guidelines are promulgated.

TiO_2 is regarded by the contractor as a unique material "having no satisfactory replacement" (Page 265). In some applications this is true, but not in all. In paper manufacturing, for example, TiO_2 must compete directly with other opacifiers such as clays. TiO_2 consumption in paper manufacturing is substantial, amounting to about 20% of TiO_2 production. Furthermore, if the price of TiO_2 [4925] were to increase sharply, its consumption would surely decrease as a result of the consequent shift away from the end products in which it is used. Paint production would undoubtedly decrease as a result of shifts to alternate coating materials such as paper, plastic films, plasters and other alternative materials. We can agree with the conclusion on Page 111 of the Economic Analysis: ". . . a price higher than about $.40 per pound makes substitution by high brightness clays and other pigments economically attractive."

It is believed that at the least, enforcement of the Proposed Guidelines would produce severe inequities between producers, and be *the* decisive factor in establishing competition and in determining who could produce what, where, and at what cost. This is not the intent of the law. Nor is it the intent of the law to favor one process over another and yet it is con-

cluded on Pages 9 and 110 of the Economic Analysis in regard to treatment costs, ". . . that sulfate process TiO_2 is at a greater disadvantage with respect to chloride process TiO_2" and "[t]he chloride producers will probably be less affected by water treatment costs and we do not anticipate any chloride facility closing as the direct result of these costs."

Technical Aspects

The validity of the basis used to establish the Guideline limits is questioned. It is stated, "The above Guidelines are based on a modeled sulfate process titanium dioxide plant using 100,000 (units not stated) of process water per k kg of product and allowing 25 mg/l of suspended solids in the effluent. The dissolved metal limitations are based on solubility limits of the oxides in a neutral pH effluent. An average of the concentrations of metal impurities in Adirondack and Australian ilmenite ores was used to establish the levels." (Page 368 of the Development Document) We believe this basis to be unduly arbitrary, and wholly unrealistic in that it does not relate to conditions at any TiO_2 plant. Water consumption per unit of production varies among the various producers, so that the amount of a metal oxide calculated to be present at saturation would be different in each case. The amount of water used per unit of production cannot be made the same for all producers because of varying processing (e.g., washing) operations, which necessarily yield waste water flows other than those apparently assumed by the contractor. Further, the waste waters will contain varying amounts of anions such as chloride and sulfate ion, again varying among producers, because of the use of different processes, which will have a major effect on the solubility of the various metal oxides. Were the "metal oxides" properly considered as hydroxides?

[4926] Laboratory tests conducted for N L by a consultant showed, for example, that at one plant, neutralization to a pH of 7 still left an equivalent of 277 lbs. of soluble iron as Fe_2O_3 per ton of product, far above the limit in the Proposed Guidelines. The consultant's report states: "This remaining iron . . . is due to the solubility of the products in neutralization." This

was based on laboratory tests by the contractor, thus providing evidence that the Guideline limits cannot be attained by the technology proposed.

The use of Adirondack and Australian ilmenites as "model ores" is wholly unrealistic. Only one producer uses Adirondack ilmenite, and, to our knowledge, only one producer uses Australian ilmenite as part of his ore input. No TiO_2 producer uses a 50:50 blend of the two, on which the concentrations of metal impurities to be obtained was based.

The Guidelines appear to refer to a plant's *net* contribution to material discharge, which can be exceedingly difficult to determine. The water intake of several plants is located in a river affected by tides. Thus, extensive analysis and statistical treatment of data would be required to evaluate the intake of listed "pollutants" in just this one water source. The problem is compounded by surface runoff, equipment corrosion, process upsets, and the location within plant complexes of power plants, acid plants, etc. The contractor's own measurements (Pages 205-210 of the Development Document) show large and erratic variations of levels of ions and of pH in actual plant effluent streams, in turn requiring statistical analysis by complex and possibly, debatable techniques. Considering those data, and the fact that we are to evaluate the *net* contribution of a plant to material discharged, the technical problem in this area is obviously extremely difficult, and raises questions about the administration of such Guidelines.

It is questioned why silica, alumina, and magnesium oxide must be removed to the very low levels in the Proposed Guidelines. They are widely distributed through natural waters and are not known to be harmful. We are unable to comment on the inclusion of cobalt oxide at this time, since it has not to our knowledge, previously been discussed or mentioned.

Discrepancies between substances listed in the Development Document and those listed in the Guidelines Document are noted. The Development Document (Pages 215, 219, 225, 368) refers to manganese as a pollutant, which subsequently is not listed in the [4927] Guidelines Document. Similarly, niobium is listed as a "harmful metal" in the chloride process category (Development Document, page 4, Table I), but is not listed in the Guidelines Document. Contrariwise, neodymium is listed in the Guidelines Document for the chloride process (top of page 28193), but not in the Development Document. The Guidelines Document also lists cobalt and MgO for the sulfate process, but these do not appear in the corresponding listing in the Development Document (Page 225). We question why, in the Guidelines Document, metals are listed for the chloride process, and metal oxides for the sulfate process.

Higher Limits for New Plants

It is noted, (page 28194) of the Guidelines Document, that the effluent limitations for a new sulfate TiO_2 plant for Cr_2O_3, Al_2O_3, and Fe_2O_3 are higher by a factor of ten than the corresponding limits applicable to an existing sulfate plant. Further there is given no effluent pH range in that case. The reason for those differences is not known.

Other Comments on Development Document

1. Page 4, Table 1: Alumina and silica are listed improperly as "harmful metals."
2. Page 27, next to last sentence should be deleted since such pigments are no longer manufactured.
3. Page 184: The amounts of strong and weak acids available varies widely depending on the types of processes and equipment in use.
4. Page 188, 1st paragraph: Believe "the 166 plant" should read "the 122 plant."
5. Page 190, Table 35: The table is insufficiently identified, confusing, impossible to understand.
6. Page 191: What are the units for the listed wastes.
7. Page 239, 3rd paragraph: Why are mining sites in N.Y., N.J., or Florida "more suited" (more able to absorb pollutants?) than most present TiO_2 plants?

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[COMMENTS ON PROPOSED RULES—
OLIN CHEMICALS.]

[5151]

OLIN CHEMICALS

120 Long Ridge Road, Stamford, Connecticut 06904

November 9, 1973

Mr. Philip B. Wisman
EPA Information Center
Environmental Protection Agency
Washington, D. C. 20460

Re: Environmental Protection Agency
40 CFR Part 415
Effluent Limitations Guidelines and
Standards of Performance and
Pretreatment for Inorganic Chemicals
Manufacturing Point Source Category

Dear Mr. Wisman:

The following comments are submitted in connection with the proposed Effluent Limitations Guidelines (40 CFR Part 415) which were published in the Federal Register, Volume 38, Number 196, on October 11, 1973, pages 28174 through 28202.

General—Since Section 304 (b) of the Water Pollution Control Act requires the Administrator to publish regulations providing guidelines to be used as a tool for establishing effluent limitations, we recommend that the guidelines be established as a range for application in a flexible manner and not as strict standards applicable without exception throughout the industry. Olin accordingly endorses the Manufacturing Chemists Association's position relative to this matter as was stated in Mr. W. J. Driver's letter of October 17, 1973, addressed to Mr. Russell E. Train. Also, we have considerable concern regarding the pretreatment standards which essentially prohibit future industrial participation in municipal treatment facilities in that industry must apply the "best available demonstrated

control technology, processes, operating technology . . ." prior to discharge to a municipal system.

Subpart F—Chlorine and Sodium or Potassium Hydroxide Production Subcategory

1. *Effluent limitations for 1977, Best Practicable Control Technology*—The phrase "best practicable control technology currently available" was adopted by Congress as the Phase I (1977) standard. It appears from the legislative history [5152] that "best practicable" was intended to be a more stringent and more comprehensive standard than the so called "industry equivalent to secondary treatment," which connotes 85 to 90 percent BOD_5 removal. The requirement was to be established by reference to the average of the best performers in an industry category. Of the 28 currently operating mercury cell facilities in the United States, EPA cited two (EPA designations—130 and 144) as exemplary, and one (EPA designation—098, outside the U.S.) as provisionally exemplary in establishing the best practicable control technology. One of these (130) involves a singularly unique situation, employing potassium chloride brine (as contrasted to sodium chloride brine) as the process raw material. None of the three exemplary plants has a production capacity in excess of 300 tons per day of chlorine. However, about one-third of the existing mercury cell chlorine capacity comes from larger facilities. Moreover, EPA did not include consideration of those facilities which have older and still viable cells that are small in terms of individual cell production capacity but have the highest mercury inventory on a per ton of chlorine production basis.

Contrary to Congressional intent, EPA has based its dissolved mercury effluent limitation of 0.00014 pounds per ton of chlorine produced on the performance of one exemplary plant rather than the average of the best performers in the industry. Although this level of discharge has been achieved by the exemplary plant, it should not be adopted as a general limitation since it does not provide for variations in plant size and age, raw material selection and availability, complexity and geographic location. Therefore, Olin proposes that the dissolve

mercury effluent guideline limitation definition be set in the form of a range having its high end based on an achievable mercury discharge level of 0.1 pounds per day (monthly average) and the low end representing the achievement of the above mentioned exemplary plant. This upper discharge level has been widely accepted within the EPA as representing best current technology as witnessed by issuance in 1973 of two NPDES permits at this level to Olin plants and at least two more permits to other manufacturers. Based on an average size mercury cell chlorine plant of 300 tons per day chlorine production, this equates to 0.0003 pounds of mercury per ton of chlorine produced. The recommended range would therefore be 0.00014 to 0.0003 pounds of mercury discharged per ton of chlorine produced.

Further, based on EPA values of an average of 0.15 pounds of mercury being discharged per day from the 28 existing mercury-cell facilities (.0005 lb. mercury per ton chlorine), a total of about 4 pounds per day of mercury is discharged in the United States from the chlor-alkali industry. Since these 28 facilities produce approximately 7600 tons per day of chlorine, application of the proposed EPA 1977 limitation of 0.00014 lb. mercury per ton of chlorine would reduce the total mercury effluent to 1.1 pounds per day. The concept of spending large sums of money to reduce the mercury effluent of the entire chlor-alkali industry by only three pounds per day as required in the proposed limitations is not economically or environmentally justifiable. A regulation allowing judicious application of a range of values would be much to the national benefit.

[5153] 2. *Effluent Limitations Guidelines for 1983*—The proposed limitation for chlor-alkali plants is "no discharge of process waste water pollutants". In specifying zero discharge EPA ignores such important factors as spills and non-recyclable wastes, waste treatment plant failures or interruptions, and Acts of God. EPA simply states that the technology exists to reach "zero" discharge by 1983. Olin agrees that theoretically this is true, but we believe the Congress intended that the very best information be employed in examining the technology and economics of each product before establishing the regulations.

This has not been done. We object strongly to the economics EPA has used to justify "zero" discharge. The EPA-recommended procedure for chlor-alkali plants to achieve "zero" discharge is sale of spent sulfuric acid, decomposition and evaporation of waste hypochlorite to reusable salt or manufacture and sale of hydrochloric acid from hypochlorite and evaporation of all other process waste water streams after mercury removal to eliminate dissolved solids. For a 175 ton per day chlorine plant, EPA estimates the additional cost for achieving zero discharge, after spending an estimated $2.14 per ton of chlorine for best practicable treatment, to be $.86 per ton of chlorine. The figure is more realistically an additional $2.00 to $3.00 per ton of chlorine. EPA gave $50,000 as the cost of an evaporator system and $200,000 for hypochlorite disposal. More realistic figures are $300,000 for the evaporator (three effects required) and $400,000 for hypochlorite control. EPA gave electrical energy cost as $1,000 per year and steam cost of $5,000 per year to obtain zero discharge for a 175 ton per day chlorine plant. Olin estimates at present day power costs these figures would be $12,000 for electric energy cost and $48,000 for steam cost for this size plant. (Even these costs are expected to rise in the near future) These discrepancies point out the erroneous economics used to support achievement of "zero" discharge. Also, the setting of the zero discharge limitation at this time by-passes the legislative time table which provides, in Section 315 of the Water Pollution Control Act, for a National Study Commission. This Commission is to study in detail all aspects of achieving or not achieving by July 1, 1983 the goals set in Section 301 (b) of the Act (best available technology economically achievable).

Olin has estimated that it would require in excess of $2,000,000 additional capital expenditure and $625,000 additional operating expenditure to achieve no discharge of process waste water pollutants at its chlor-alkali facilities. This expenditure of between $4.00 and $5.00 of capital per annual ton of chlorine would accomplish the elimination of waste streams which are innocuous to most receiving streams. Here again is a case of establishing an unrealistic limitation which cannot

be supported on an economic basis and which will have little, if any, beneficial effect on the environment. The outstanding effect of the "zero" discharge limitation will be an increase in the cost of chlorine by approximately 10%, which will be reflected in the cost of chlorine-consuming products such as plastics, paper products, textiles, etc. and in the cost of municipal waste treatment.

[5154] The cost estimates, economic impact and treatment costs to achieve the effluent reductions attainable by the application of the best practicable treatment currently available and by application of the best available treatment economically achievable have not been demonstrated. It is understandable that cost evaluations are off by a significant factor since in the EPA estimate it is acknowledged that installed costs did not include auxiliary equipment such as boilers or cooling towers, major buildings, land purchase or other costs specific to each application.

Subpart H—Hydrofluoric Acid Production Subcategory

In order to avoid generally recognized, serious air pollution problems resulting from the production of hydrofluoric acid the calcium sulfate is usually quenched by slurrying in water. The slurry system will contain some impurities originating in the raw material fluorspar, calcium sulfate and fluorides. The proposed "no discharge" conceivably calls for total reuse of all process water including the above-mentioned quench water. Where impoundment and recycle are practiced, rainfall in excess of evaporation loss may preclude the recycle of all water. Olin proposes that an allowance be made for the release of excess recycle water.

Subpart U—Sulfuric Acid Production Subcategory

We believe that double absorption sulfur-burning sulfuric-acid plants can meet the proposed rules for "no discharge" of process waste water pollutants. However, we strongly object to the rule that there should be no process waste water discharge from a single absorption sulfur-burning sulfuric acid

plant where the plant meets air quality standards through the use of a tail gas clean up system. On page 28177 of the Federal Register it is recognized that tail gases for these sulfuric acid plants can be scrubbed and treated. On page 222 of the "Development Document for Proposed Effluent Limitations Guidelines" it is stated that SO_2 scrubber effluent should be minimized on existing installations and no waterborne wastes should be allowed from future SO_2 removal system. On page 230 of this document it states in the last paragraph that existing SO_2 control systems which discharge waterborne waste can be made wastefree by concentration and recovery of sodium sulfate which can be sold. Before Olin provided purge stream treatment of its Curtis Bay, Maryland sulfuric acid plant, the possibility of selling or even giving away the sodium sulfate was investigated. However, *no customers or takers could be found.*

It would appear that those plants that have pioneered in the development of pollution control technology and have installed equipment thought to be acceptable to Federal [5155] and State authorities are being penalized for this effort. Past effort to reduce pollution should not go unrecognized when the waterborne waste products resulting from these efforts are modest and are compatible with the receiving waters. The rules should be amended to permit the discharge of treated waste water from air pollution control facilities in a single absorption sulfur-burning sulfuric acid plant where pH has been adjusted and the sulfate discharge is compatible with the receiving waters.

Olin offers these objections and recommendations for change of the proposed rules hoping to affect the development of effluent limitations that offer the optimum benefits to the country both environmentally and economically.

Yours very truly,

Olin Corporation
C. L. Knowles, Jr.
Director of Engineering and
Environmental Affairs

[COMMENTS ON PROPOSED RULES—
E. I. DU PONT DE NEMOURS
& COMPANY.]

[5156]

E. I. DU PONT DE NEMOURS & COMPANY
Wilmington, Delaware 19898

Legal Department

November 9, 1973

Mr. Philip B. Wisman
Information Center
Environmental Protection Agency
Washington, D. C. 20460

RE: COMMENTS ON THE PROPOSED REGULATIONS—EFFLUENT LIMITATIONS AND STANDARDS OF PERFORMANCE AND PRETREATMENT FOR INORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY, AND COMMENTS ON

(1) THE EPA DEVELOPMENT DOCUMENT (EPA 440/1-73/007) AND ON

(2) THE ECONOMIC ANALYSIS OF PROPOSED EFFLUENT GUIDELINES, EPA-230/1-73-015.

Dear Mr. Wisman:

We, at Du Pont, seriously question the effluent limitations and the basis for them as set forth in the Inorganic Chemical Industry Guidelines. Not only are most of the effluent limitations for best practicable control technology and best available technology unachievable, but they are also not supported by the record as required by the Act.

Many of the conclusions drawn did not take into account the factors specified in Section 304(b) in determining the control measures and practices applied to point sources.

We agree with the attached legal position paper of MCA on the guidelines and request that EPA state that the guideline limits are not standards but are merely guidance to achieving an effluent reduction which is technologically and economically feasible.

We find few areas in which we concur conceptually with EPA. One of them is item (6) on page 28180 where EPA states that, except for those considered harmful, dissolved solids should not be limited. We interpret this to mean that dissolved solids do not fall within the term "process waste water pollutants." However, EPA did not clarify this point in the definitions for "process waste waters" in Subparts A through V. We suggest that it be so defined as to exclude dissolved solids.

[5157] We also concur with the decision in paragraph (9) of page 28180 to deal with cooling water and boiler blowdown and water supply waste waters as a separate category. In the interest of clarity, we suggest that each subpart specify that these waters are not within the purview of these subparts.

Our analysis of the Development Document shows that most of the erroneous conclusions and insufficient economic evaluations in the Draft Development Document (General Technologies, June, 1973) have been repeated. Du Pont commented extensively on the draft document, either directly to EPA or to the Effluent Standards and Water Quality Information Advisory Committee.

We are concerned that the final Development Document differs little from the draft version. No record has been published to justify or support EPA's decision not to correct the erroneous conclusions drawn in the Development Documents as pointed out in the copious comments submitted by reviewers of that draft Document.

EPA merely states that the data upon which these guidelines were established included EPA permit applications, EPA sampling and inspection, consultant reports, and industry submission. However, the "Development Document for Proposed Effluent Limitation Guidelines and New Source Performance Standards" which details the analysis undertaken in support

of the proposed EPA regulations duplicates with very few exceptions, the consultant's (General Technologies) draft report.

We also disagree with the method used for categorization of the inorganic chemicals studies. EPA states that their subcategorization scheme "simplifies the application of effluent limitations guidelines." While this may be true, we do not believe that it is realistic that every process making the same product can accomplish the same effluent limitation guideline and standard reflected in the best practical technology currently available (BPCTCA) and best available technology economically achievable (BATEA).

We feel that inadequate consideration has been given to the great differences in individual facilities with regard to raw waste load, size of plant, age and type of process equipment, and climatic as well as geographic location factors.

Furthermore, economic equity appears to have been disregarded. It should be pointed out that best practicable control technology currently available, as defined in PL 92-500, requires consideration of the total cost in relation to effluent reduction benefits to be achieved. EPA has not considered the *total* cost in relation to the effluent reduction benefits achieved. The conclusions of the Economic Analysis are erroneous because they were based on the final Development Document which merely repeats the errors of the draft documents. The [5158] Economic Analysis then merely compounds the errors of both documents. In any event, the costs are substantially lower than actual costs.

A. Costs

The EPA conclusions are only as good as the cost information. An indication of this is shown on page 110 (subsection 4) of the Economic Analysis wherein the sensitivity to higher treatment costs were examined for the titanium dioxide industry. This citation shows a marked difference in the conclusions on product price, plant closings, etc., if actual treatment costs are four times higher than those shown in the Development Document.

The economic impact discussion in the preamble (Notice of Proposed Rulemaking, item iv, page 28178) contains information taken from the Development Document and apparently ignores conclusions of the Economic Analysis. For example, the later document concludes (page 9), that the best available technology costs are likely to result in plant shutdowns for "chlorine/caustic soda, lime, sludge sulfuric acid, sulfate process titanium dioxide and sodium bichromate." Even for best practicable technology, shutdowns are likely for lime, sludge sulfuric acid, and sodium bichromate. Yet, item iv concludes that the "guidelines and standards will have no major economic impact." What is a major impact? How much more of an impact than stated in the Economic Analysis will there be if the cost of treatment estimates are low as we suspect they are? The preamble makes no mention of the potential for plant shutdowns.

The industry-wide cost calculations do not adequately cover:

- Isolation and treatment of non-contact cooling water including impoundment facilities,
- Isolation and treatment of wash-down water,
- Improvements in process control to reduce waste load variations,
- Isolation and treatment of spills and leaks,
- Segregation of sanitary, process, and non-contact cooling water, and
- Proper containment of sludge to prevent contamination of ground water.

[5159] Many of these cost elements will be prohibitively high for existing plants. Again, no basis is provided, nor are the conclusions supported by the documents or any data.

Furthermore, treatment costs and methods seem to be only geared to plants using the highest grade raw materials. Page 28178 states: "The purity of the raw materials used in many manufacturing processes significantly influence the waste load. Economics and availability, however, necessitate use of impure ores and technical grade reactants. These impurities may be

controlled by washing, purifying, separating or beneficiating the raw materials prior to use in the manufacturing process. Treatment of ores may be done at the mining site where beneficiating waste may be controlled and handled with minimal pollutant effects."

Such reasoning raises these kinds of critical questions about the conclusions reached:

- Do cost effectiveness calculations include beneficiation costs and costs of handling beneficiation wastes? Many "mines" are not in remote locations where waste disposal is no problem. Furthermore, the guidelines are applicable regardless of location.
- Do the guidelines accommodate beneficiation "in house" at the manufacturing plant site?
- Is it EPA's policy to export dollars, jobs, and pollutants to foreign countries where raw material sources might be located?

EPA also states that the annual cost to achieve best practicable technology is less than $1.00/ton of product for fifteen major chemical manufacturing processes and less than $2.00/ton of product for five chemicals. They further state that annual treatment costs are $14.00 and $12.00/ton of product for hydrofluoric and sodium dichromate.

Du Pont cost figures to achieve EPA proposed discharge levels determined for some of the twenty-five chemicals range from a low of $2.00/ton to a high of $49.70/ton of product. Our comments on cost figures contained in the General Technologies' report are applicable to the "Development Document" and are included in the attached Du Pont comments submitted to EPA July 1973. We wish to cite as further examples of incorrect cost figures the following:

- Energy requirements for pumps, clarifiers, etc., in terms of gal./yr. of fuel oil are low due to an error in converting hphr to Btu. One of the many examples can be seen on p. 272 of the "Development Document." It is reported that "Energy requirements for pumps, clarifiers, drives, etc., are taken as 7.5 kwhr (10 hphr) or 53 x 10 kg cal (210 x 10 Btu) or 795 liters/yr. [5160] (210 gal./yr.) of fuel energy." The figures for converting hphr to Btu is 2545 Btu/hphr not 210 Btu/hphr. Therefore, using the following calculation, i.e.,

$$\text{Energy Requirements} = \frac{2545\ \text{Btu/hphr} \times 10\ \text{hphr} \times 8000\ \text{hrs./yr.}}{150{,}000\ \text{Btu/gal of oil}}$$

$$= 1358\ \text{gal./yr. of fuel oil energy assuming 100\% efficiency.}$$

Since overall conversion of energy is about 20% efficiency, actual consumption would be 6800 gal./yr. of fuel oil.

- Costs to recover sodium sulfate—p. 345—Additional costs to recover sodium sulfate from a Wellman SO_2 scrubbing system will not even cover basic equipment costs. Using the capital costs shown in the General Information Section of the "Development Document" starting on p. 310 for the various unit steps, the resultant installed cost of recovery equipment is close to $1,000,000. However, EPA using supposedly the same figures comes up with a cost of $80,000.

B. Thirty-Day vs. One-Day Limits

We question the basis of the difference between the permitted one-day vs. 30-day average values of "process wastewater pollutants", where specified. In *every* case, the one-day limit is twice the 30-day limit. Yet nowhere in the Notice of Proposed Rulemaking, the Development Document, or the Economic Analysis is there one shred of evidence to support such an across-the-industry waste variability. The Development Document contains a section, "Effluent Data Analysis", pp. 203-213, where, presumably, such variability is included. Even this document states that day-to-day effluent data could not be developed for many plants sampled, and was available from only a "very few". How then can the 2 to 1 ratio of one-day to 30-day values be concluded as achievable? There is no record to support this conclusion even in the case of exemplary plants. In fact, the entire section on pp. 203-213 contains abundant and repeated warnings of the limitations of the data on waste variability. The Development Document

contains many misconceptions in the "Effluent Data Analysis" section. These are detailed in the attached comments, previously given to EPA, which were completely ignored in preparing the final Development Document. The section is verbatim as it was.

[5161] **C. Concept of "No Discharge of Pollutants"**

For fourteen of the twenty-two Subparts, best practicable control technology currently available is declared to be "no discharge of process waste water pollutants to navigable waters." While dissolved solids are not included, p. 28180, item (6), the requirement that suspended solids, for example, be *zero* is not realistic. Normally available equipment for removal of suspended solids such as clarifiers, air flotation devices, filters, etc., cannot produce *zero* suspended solids. The requirement of such a limit for any process, especially those subject to washdown of equipment, spill cleanup, etc., is beyond what is normally considered *currently available* practice.

EPA states that fourteen chemical manufacturing processes, including aluminum chloride, aluminum sulfate, calcium carbide, hydrochloric acid, calcium oxide, potassium sulfate, sodium bicarbonate, sodium chloride, sodium silicate, and sulfuric acid generate relatively small amounts of waste water. The process waste streams generally may be treated and recycled, re-used, evaporated for product recovery or sale. We categorically disagree with these conceptions. Nowhere in EPA's proposed rules or their "Development Document," which is referred to in this report, do they provide information on availability of markets for recovered products or cost of recovery.

EPA states that calcium chloride, hydrogen peroxide, sodium, sodium chloride, and sodium carbonate production require treatment to reduce quantities of suspended solids. They state that treatment generally consists of various liquid separation operations including sedimentation and filtration to reduce effluent concentration of suspended solids to 25 mg per liter. Our experience has shown that gravity clarification will not insure 25 mg per liter effluent quality. The proposed guidelines

extend best practicable treatment technology and make polishing filters frequently obligatory. The means of accomplishing such filtration have not been established and because of the postprecipitation characteristics of various wastes, standard filtration is of questionable applicability in many cases. Vacuum or pressure filtration may be applicable, but because of the fineness of particles involved, pre-cost techniques would often be required. The incremental reduction in suspended solids achieved by a polishing filter over that obtainable in well-operated gravity clarification is of questionable justification considering the added energy and solids wastes disposal requirements. An effluent guideline limitation based upon an effluent concentration of not less than 50 mg per liter is more compatible with actual performance of well-designed and operated gravity clarification facilities.

[5162] We, therefore, contend that best practicable treatment technology is not less than 50 mg per liter suspended solids. BATEA guideline levels for suspended solids should be developed after demonstrated technology becomes available.

EPA states that neutralization of acidic or alkaline streams resulting from the manufacture of these chemicals is required. This is consistent with what we consider BPCTCA. However, EPA further states that recycle and re-use of various waste streams are possible. We contend that recycle and re-use has not been demonstrated especially in the case of sodium metal, hydrogen peroxide, and merchant plants for sulfuric acid and nitric acid. In suggesting resale of products from waste streams, EPA has completely ignored the energy requirements for evaporation of the vast quantities of water which would be required for resale of these products. Also, EPA has completely ignored the problems associated with obtaining the product purity needed to compete in today's market place.

We agree with EPA that spills and leaks can be minimized by employing good housekeeping practices. However, in their proposed rules, we can see no provision for those spills and leaks which inevitably occur in any manufacturing process no matter how good the housekeeping practices are. We do not feel that spills and leaks can be eliminated. For this reason,

we do not believe no discharge of process waste pollutants is practicable and ask that consideration be given for discharges resulting from maintenance and malfunction as directed by the U.S. Court of Appeals in *Essex Chemical v. Ruckelshaus.*

EPA states that "cooling water that picks up process related pollutants from leaks becomes process waste water. It is the responsibility of the plant to monitor cooling water streams for leaks, and to treat contaminated water to the standards established for process waste water discharges." Since the definition of pollutants in process waste water is unclear, we cannot really comment on this statement. If, however, it is meant to say, for example, that sulfuric acid or nitric acid leaks should be treated to zero level of sulfate or nitrates, we disagree, unless dissolved solids are excluded from the subparts.

We contend that no matter how well a plant is operated, leaks and spills will still occur. We believe that the plant should monitor these cooling water streams for leaks. However, we do not agree that these contaminated cooling waters should or can be treated to the same standards established for process waste water discharges namely that of no discharge of process water pollutants.

[5163] Besides, we find it extremely difficult to evaluate the proposed effluent limitations guidelines without a clear definition of what is meant by pollutants. If it is the intent of the proposed regulations to define pollutant as any material not naturally occurring in the influent water and to limit the discharge of this material to a concentration equal to or less than its concentration in the incoming water, then we must take exception. Using this definition, in almost every case plants would have to achieve total recycle of process water to meet the discharge limits. EPA established the proposed limitations on the basis of information contained in the "Development Document". Based on our review of the information contained in this referenced document, we do not feel that no discharge of process pollutants has been demonstrated to be either practicably or economically feasible if pollutant is defined as any material not naturally occurring in the influent water.

D. Air Pollution Control Equipment

EPA states that in many manufacturing processes, wet scrubbers are used to control air pollution. We agree. They further state that the scrubbing solution may generally be treated and reused or sold. We disagree since very frequently these dilute solutions cannot be practicably recovered. EPA further states that in some cases, conversion to a dry abatement system is justified because of product recovery. We contend that dry abatement systems are not available to treat all air pollution problems, especially high temperature exhausts. Generalizations such as this have allowed EPA to discount aqueous wastes from air pollution control devices in recommending no discharge of process waste water pollutants.

E. Incomplete Information

The Development Document is incomplete. It states on page 269, that the "cost developments, calculations, references and rationales for treatment and disposal techniques pertinent to the inorganic chemicals industry are detailed in Supplement A". It also says that the "costs for specific plant treatment systems are given in Supplement B". These Supplements are not included in the Development Document. Thus, commenters have *no opportunity* to evaluate the information on which some of the conclusions were based.

[5164] **F. Subcategory Comments**

Attachment A is an MCA legal position on the effluent guidelines.

In Attachment B are specific comments pertaining to the following Subcategories of the Inorganic Chemicals Manufacturing Point Source Category: aluminum sulfate, nitric acid, sulfuric acid, sodium silicate, hydrochloric acid, hydrofluoric acid, hydrogen peroxide and sodium metal.

Attachment C contains specific comments on the titanium dioxide production subcategory.

Attachment D contains comments on the statistical misconception in the section of the Development Document on "Effluent Data Analysis".

Attachment E contains prior correspondence of Du Pont relative to the Development Document, final or draft.

We expect that you will give serious consideration to these and past Du Pont comments on the inorganic chemicals guidelines and standards of performance. We trust these will be helpful to EPA in developing equitable guidelines achievable by U.S. industry, yet compatible with a healthy economic environment.

Very truly yours,
L. L. FALK

° ° ° °

[COMMENTS ON PROPOSED RULES—
MANUFACTURING CHEMISTS ASSOCIATION]

[5264]

MANUFACTURING CHEMISTS ASSOCIATION
1825 Connecticut Avenue, N.W. • Washington, D. C. 20009
(202) 483-6126

November 12, 1973

WILLIAM J. DRIVER
President

EPA Information Center
U.S. Environmental Protection Agency
Washington, D. C. 20460

Attention: Mr. Philip B. Wisman

Subject: 40 CFR Part 415—Effluent Limitations Guidelines and Standards of Performance and Pretreatment for Inorganic Chemicals Manufacturing Point Source Category

Dear Sirs:

This letter is submitted on behalf of the Manufacturing Chemists Association (MCA) with regard to proposed Effluent Limitations Guidelines and Standards of Performance and Pretreatment for Inorganic Chemicals Manufacturing Point Source Category (40 CFR Part 415), published in the FEDERAL REGISTER October 11, 1973.

MCA is a non-profit trade association with 170 United States member companies representing more than 90 percent of the production capacity of basic industrial chemicals within this country. As manufacturers and handlers of the chemicals in question, our members have a direct and critical interest in the proposed rules.

We are pleased EPA has reaffirmed that total dissolved solids (TDS) per se do not cause deleterious effects in receiving waters and cannot be practicably limited by across the board application of technology. We concur in the concept of relating limits to specific "harmful" constituents, and we support the consideration the Agency has given to non-water quality and related cost/benefit impacts.

[5265] Our overall reaction to the proposed rules is one of serious concern, as a number of major and critical unresolved issues remain, namely:

- the impracticable, if not impossible, imposition of economically prohibitive zero discharge;
- the need for guidelines as a range for application in a flexible manner;
- levels of control consistent with and supported by a demonstrated technological base;
- those factors mandated by Congress taken into account in the application of effluent limitations;
- pretreatment standards which do not prohibit continued or future industrial participation in joint treatment facilities.

We expressed those concerns in previous communications and now recommend that the Agency:

- adjust its narrow interpretation of the Act and of Congressional intent, and

- restructure its program to one of equitable enforcement of effluent limitations derived from a technically sound guidelines and standards base.

We append herewith technical assessment comments and specific reactions developed by major producers of inorganic chemicals. A copy of related previous communications, listed as follows, can be supplied upon request:

- October 26, 1972—letter by W. J. Driver to Allen Cywin, Director of EPA Effluent Guidelines and Standards Division, relative to a working document on effluent limitation guidance for the inorganics industry category.

[5266] • November 21, 1972—letter by H. B. Brown to Allen Cywin transmitting documents presented by chemical industry experts during EPA's November 16, 1972, Effluent Guidelines Seminar—Inorganic Chemicals.

- May 11, 1973—letter by H. B. Brown to Dr. Martha Sager, Chairman, Effluent Standards and Water Quality Information Advisory Committee, relative to the Committee's functional activities in the EPA development of effluent limitations guidelines.
- August 1, 1973—letter by W. J. Driver to Allen Cywin relative to technical review comments on June 1973 draft Development Document for Effluent Limitations Guidelines and Standards of Performance for Inorganic Chemicals, Alkali and Chlorine Industries and Non-Fertilizer Phosphorus Chemicals Industry.
- October 17, 1973—letter by W. J. Driver to Administrator Train relative to the invitation to comment on proposed alternative approaches by which effluent limitations are to be determined.
- November 12, 1973—letter by W. J. Driver to Administrator Train relative to legal and technical reasons for redirection of EPA effluent limitations program.

Sincerely,

W. J. Driver

Attachments

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[6472]

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Washington, D. C. 20460

September 25, 1973

Effluent Standards and Water Quality Information Advisory Committee

Effluent Standards and Water Quality Information Advisory Committee Evaluation of Current Methods for Establishing Effluent Limitations for Industrial Point Source Discharge

The Committee has found the current procedures for establishing effluent limitation guidelines for point source industrial discharges to be un-scientific in their disregard of the following items and/or variables:

1. Little consideration has been given to the erroneous and/or incomplete data on which many of the initial draft contractors' reports were based.
2. Little consideration has been given to great differences in individual facilities among generic industries with regard to RAW WASTE LOAD: SIZE OF PLANT: AGE AND TYPE OF PROCESS EQUIPMENT NOW OPERATING IN A GIVEN PLANT: CLIMATIC AND GEOGRAPHIC LOCATION FACTORS.
3. Lack of consideration of differences between SOLUBLE AND SUSPENDED BOD.
4. ECONOMIC EQUITY has been disregarded with respect to instructions in Sect. 304(b) involving cost of application of practical and available technology, particularly as these relate to SMALL PLANTS within generic industries.
5. SPECIFIC EXAMPLES where these items have not been given adequate consideration are to be found in the following studies and published proposed limitations:

[6473]

SEAFOOD PROCESSING	PLASTICS AND SYNTHETICS
INORGANIC CHEMICALS	CEMENT

FRUITS AND VEGETABLES	MEAT PACKING
STEAM ELECTRIC POWER	IRON AND STEEL

(Others not cited here)

6. Little consideration for some industrial sectors has been given to utility of the guidelines to actual permit conditions in regions.
7. THEREFORE, ES&WQIAC has developed a scientifically defensible method for establishing industrial point source effluent limitations, which method is described in detail in the attached document.

In conclusion, the ES&WQIAC, recognizing the serious need to establish scientifically defensible bases for standards, regulations and guidelines promulgated through the Federal Register, strongly recommends adoption and publication of the analytical procedure described in the attachment. It is generally held that this recommended approach will guarantee a more equitable treatment for both industry and public concerns in determining the impact of Federal Regulations technologically, economically, and from a timetable for implementation viewpoint. The Committee seeks the guidance and direction of the Administrator in the operational direction and implementation of its proposal since this responsibility falls beyond the scope of its immediate mission.

MARTHA SAGER, Chairman
Effluent Standards and Water
Quality Information
Advisory Committee

Dated: September 25, 1973

Attachment:

[6474] **DRAFT ONLY—DO NOT QUOTE OR CITE**

Draft for Review of Report to the Administrator on Development of Effluent Guidelines and Standards of Performance

Summary

As currently conceived, definitive effluent guidelines are being promulgated for American industry. These guidelines,

strictly applied, can effect undue hardships on a significant number of individual operations. The ES&WQIAC Committee recommends a modification of these guidelines based on state of the art wastewater treatment technology (Best Practical Technology). In addition to the current sub-categorization, considerations which impact an individual industrial operation will be included in models established as BPT. The current data base available from EPA and industry will serve as a baseline to establish raw waste loads. This baseline will be modified as additional data are generated and the predictive models of treatment technology are improved. It is the strong belief of the Committee that these measures will:

1. result in widespread acceptance by the technical community
2. minimize litigation
3. establish a sound basis for legal enforcement of the guidelines.

Rationale

There are serious limitations in the approach of establishing definitive and specific effluent limitations for a major segment of American industry without adequate sub-categorization of the industry. [6475] Differences in effluent qualities attainable within an industrial category may arise due to technical limitations of the wastewater treatment process and economic constraints imposed by size, age or level of technology may result in serious competitive disadvantages.

The purpose of this report is to develop guidelines which will establish standards of performance thereby:

1. Provide a technical and economic basis for BPT by sub-categorization of the industrial categories,
2. Establish a procedure to define definitive effluent qualities for the industrial sub-categories defined by (1) above.

The proposed sub-categorization considers four constraints on effluent standards of performance reflecting size, age, process technology and geographical location. These are:

(a) Treatment Technology—the effect of wastewater characteristics on effluent quality attainable by the selected wastewater treatment process (BPT).

(b) Operational Characteristics of the industry—seasonal operations, wide fluctuations in wastewater volume or strength due to multiproduct operations.

(c) Geographic and Climatic considerations—spray irrigation and evaporation lagoons may be applicable to some areas of the country but not others; biological treatment in northern parts of the country is adversely affected by low temperature operation.

(d) Economic equity—in some industrial categories smaller plants [6476] product a higher RWL than do large plants. Economy of scale reflects higher treatment costs for smaller plants than large ones for the same process. Both of these factors may result in undue economic bias on smaller plants within an industrial category.

Examples of the application of (a), (b) and (d) above are detailed in the Appendix of this report. Subcategorization of the first twenty-seven industries in accordance with these four considerations is shown in Table 1.

For each of the sub-categories within an industrial classification effluent limitations are developed as follows:

1. The RWL and wastewater flows per unit of production for the industrial sub-category are established statistically upon the data base. For purposes of the guidelines one standard deviation of the industry-wide wastewater flows is used for computation. Plants with water use in excess of this should reasonably be expected to attain this level by in-plant conservation practice.
2. BPT for the sub-category is selected.
3. The average effluent quality attainable is determined from process models reflecting present exemplary performance.
4. The average effluent limitation in lbs pollutant/unit production is the product of (1) and (3).
5. Effluent variability is defined considering process operating temperature, variation in RWL and variation in product mix.

[6477] **Table 1**

INDUSTRIAL VARIABILITY FACTORS

INDUSTRY	A	B	C	D	E
Asbestos					x
Fiberglass					x
Beet Sugar			x		
Cane Sugar		x	x	x	
Cement			x		
Dairy			x	x	
Electricity		x		x	
Feedlots			x		
Fertilizers		x	x		
Grain Milling		x			
Flat Glass					x
Iron & Steel	x	x		x	
Inorganic Chemicals	x	x	x		
Organic Chemicals	x	x	x	x	
Non-Ferrous Metals (Bauxite)					x
Plastics & Synthetics	x	x	x	x	
Petroleum	x	x	x	x	
Pulp & Paper	x	x	x	x	
Soaps & Detergents				x	
Textiles	x	x	x	x	
Seafoods	x	x	x	x	
Timber	x	x		x	
Fruits & Vegetables	x	x	x	x	
Leather	x	x		x	
Phosphate Manufacturing		x	x		
Meat Packing			x	x	
Steam Electric	x	x	x	x	
Rubber	x	x		x	
Ferro alloys	x		x		

A = Treatment Technology D = Economic Equity

B = Operational Characteristics E = None

C = Geological Climatic Considerations

[6478] In many cases the data required to establish the effluent limitations as defined above are available from the contractors reports, Corps of Engineers permit applications and supplemental data submitted to ES&WQIAC. In some cases additional data will have to be obtained from industry. Mathematical models and computer procedures are presently available or can be readily developed to implement the procedures outlined above.

The methodology proposed by ES&WQIAC affords a mechanism for adequately considering the factors required by Section 304(B)(1)(b) of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) to be taken into account. It does this by providing a quantitative technically-sound basis for sub-categorization of industrial categories which is necessary to insure that the effluent limitations are (1) consistent with the requirements of the act, and (2) realistically achievable by classes and categories of point sources. It is the opinion of the Committee that implementation of this procedure will minimize controversy and litigation which may result from arbitrarily-established inflexible standards.

[6479] **Effluent Standards Model Development**

1. Develop statistical plots of RWL and flow for the industrial category. Determine if size, age or type of process has a major effect and if so break the statistical plots accordingly. This is based on flow/unit production, BOD/unit production, etc. Eliminate plants which have extensive water reuse or product recovery not normally practiced in the industry. Base line flow/unit production is one standard deviation from the mean.

2. Determine from wastewater treatment operating data on BPT (e.g., activated sludge) whether the wastewater characteristics, e.g., TDS, k, etc., have an effect on process performance under optimal design operating conditions. If so, categories should be established with appropriate effluent qualities.

3. Define operational characteristics of the industry, e.g., seasonal, product mix variability and establish appropriate breaks relative to BPT, e.g., activated sludge for continuous operations, aerated lagoons for seasonal operations, etc. Establish effluent qualities for each grouping.

4. Delineate geographical and climatic effects. BPT in some cases can be defined by area if spray irrigation or evaporation ponds are applicable. In all cases an alternative for discharge using wastewater treatment should be considered in the event that land availability or cost mitigates against the land disposal alternative. Wastewater characteristics, particularly temperature [6480] needs to be considered. For example, spray irrigation of a waste in cold climate areas may be feasible if the waste temperature is sufficiently high. Effluent quality from a biological treatment process should be adjusted for winter operation in cold climates.

5. For each of the groupings defined in (1) the cost of compliance/unit production is generated. Selecting the large plants with prevalent technology, BPT is defined and the costs computed. Costs are computed for all the other groupings using BPT defined above and for alternative wastewater treatment processes. Processes are selected and effluent quality defined for each grouping considering a reasonable cost equity.

6. As additional data is compiled upon on-going operations, these data will be added to the data base for current best practical technology. Treatment models will be updated as the state-of-the-art advances.

This procedure presently only considers BPT. It is the opinion of the committee that the same procedure can be employed to establish standards of performance under BAT. It is felt that many of the older, less efficient industrial plants will phase out or be modernized by 1983 and guidelines should reflect this trend.

* * * *

[6495] MANUFACTURING CHEMISTS ASSOCIATION

1825 Connecticut Avenue, N.W. • Washington, D. C. 20009

(202) 483-6126

November 12, 1973

WILLIAM J. DRIVER
PRESIDENT

Honorable Russell E. Train
Administrator
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D. C. 20460

Dear Mr. Train:

This letter is in support of our October 17, 1973 recommendation that the Agency's effluent limitations program be redirected.

We believe that the proposed EPA effluent guidelines are not consistent with the requirements of the Federal Water Pollution Control Act Amendments of 1972 and that the proposed effluent limitations in the guidelines go far beyond the effluent reductions which Congress intended.

We also believe that if the suggested effluent limitations in the guidelines are adopted and used as *standards* or *requirements* by the EPA's Regional Offices, the regulations will violate the Administrative Procedure Act.

The Administrative Procedure Act requires that an adjudicatory hearing be held where the facts are within the knowledge or province of a few or a particular party. Since only the discharger(s) subject to a subcategory of a guideline know whether the facts support that effluent requirements can be met, an adjudicatory hearing is mandated for subcategories where the requirements are at issue.

Davis confirmed this in Section 7.02 of his *Administrative Law Treatise*. He said that an opportunity for a trial should be given where adjudicative facts are:

"intrinsically the kind of facts that ordinarily ought not to be determined without giving the parties a chance to know and to meet any evidence that may be unfavorable to them."

[6496] Thus, it is concluded that, if pollutant loadings are considered requirements as opposed to guidance, particular parties affected by subcategory loadings can require adjudicatory hearings. These hearings will bring out the basis for imposing any such requirement on them, since the facts are within their province and apply only to them.

To prevent early litigation on the question of whether the EPA should hold adjudicatory hearings, EPA should publish the procedures EPA will follow in implementing the guidelines. Because EPA will be issuing thousands of permits, the EPA procedure should state that the documents are only to be applied with *discretion as guidance*. The procedure should also state that less stringent limits may be set for individual plants where the guidelines effluent limitations are not achievable.

It is also suggested that EPA issue a policy directive to its Regional Offices directing them to use the limitations as a guide, allowing the Regional Office the opportunity to adjudicate with the discharger the reasonableness of achieving the load limits in the guidelines.

Furthermore, even if the effluent limitations in the guidelines are used as guidance, we question whether the guidelines were intended to include specific effluent limitations. Section 304(b) requires the Administrator to promulgate regulations providing guidelines, which are to be used *as a tool* in establishing effluent limitations. The guidelines were not intended to set forth specific effluent limitations, production-based or not. Production-based effluent limitations go beyond the requirements of Section 304(b).

Section 304(b) requires that the guidelines specify *the level of effluent reduction attainable*. Effluent reductions—not specific effluent limitations—are the basis for determining whether

best practicable control technology or best available technology is achieved by classes or categories of sources. The other factors to be considered in determining the required control measures and practices necessary are set out in Sections 304 (b)(1)(B) and 304(b)(2)(B).

[6497] Sections 301(b)(1)(A) and 301(b)(2)(A) only provide for the administrative achievement of effluent limitations by technology. These sections do not provide that effluent limitations be set forth in the guidelines. Congress intended that a *uniform system of effluent reductions be specified in the guidelines*—not uniform limitations based on production.

The suggested production-based effluent limitations go beyond *effluent reductions which are attainable* through technology under Section 304(b)(1)(A) and Section 304(b)(2)(A). There are inherent faults in the production approach which lead to far too stringent pollutant reductions in many cases. The variation in water usage and diverse process considerations are not taken into consideration in such an approach.

To further establish the unreasonableness of the effluent reductions in the guidelines, we would like to point out that Congress in the Senate Report expressed the expectation that 95 to 99% removal of pollutants be achieved by 1983. Many of the 1977 reductions are at these levels and beyond them. The Inorganic Guidelines provide for zero discharge of pollutants for 14 out of 22 product subcategories.

For guidelines which specify removal efficiencies of 95% to zero discharge by 1977, the guidelines have not specified the measures and practices to be considered under Section 304 (b)(2). Even the requirements of Section 304(b)(1) have only been partly met. To require the application of best available technology economically achievable in 1977, both the requirements of best practicable control technology and best available technology must be taken into account.

Zero discharge is *in theory* achievable if all involved variable factors are resolved and the ultimate disposal of waste residuals is allowed under other provisions of law and all other environmental consequences and stresses are acceptable to all segments of our society. This is not to imply that the imposition of zero discharge is indeed feasible in practice. The unrestricted application of technology makes most things possible, but the sacrifices are great and the economic, social, and environmental consequences would be unacceptable in most instances. The guidelines in [6498] establishing zero discharge requirements have not considered the affordability of the *total* cost to a particular *industry* of achieving zero discharge as well as the effluent reduction benefits of going to zero discharge by 1977 instead of 1983 or later.

Congress established the National Study Commission (NSC) under Section 315 to evaluate all aspects of the total economic, social, and environmental effects of achieving or not achieving the effluent limitations and goals set forth for 1983. The NSC report must be submitted by October 19, 1975. Congress intended that there be a review of the impact of the 1983 effluent limitations before the limits are implemented.

The practical result of applying many of the 1977 effluent limitations is that extensive process and procedural innovations, changes in operating methods, and very substantial process changes will be necessary to meet the guidelines. Best practicable control technology currently available is defined on page 101 of the House Consideration of October 4, 1972 as the:

> "treatment facilities at the end of a manufacturing, agricultural, or other process rather than control technology within the process itself."

Certainly some process changes may be required by 1977 under Section 304(b)(1)(B), but very substantial changes in processing are not required until 1983 under Section 304(b)(2)(A). The guidelines for 1977 would mandate all types of process changes immediately to meet the levels of reduction.

Besides, even if process changes were required by the Act, the control technology for 1977 is not "currently available" for those processes specified. In many instances technology cannot be transferred to treat certain types of troublesome effluents.

We feel that the EPA has not demonstrated that the technology is currently available within a

> "reasonable level of engineering and economic confidence in the viability of the process."

as set out on page 101 of the House Consideration of October 4, 1972.

[6499] It should be further pointed out that Section 301(b)(2)(A) places the burden upon the Administrator to show that zero discharge is technologically and economically achievable. This has not been done. The guidelines fail to recognize the position taken by Mr. Ruckelshaus that the discharge of pollutants on land is not zero discharge but merely tertiary treatment. The water has to go somewhere.

These matters relate to a number of point source categories for which the Agency has or intends to publish proposed rules. Of specific concern to our member companies are the phosphate manufacturing, plastics and synthetics, inorganic chemicals, and organic chemicals point source categories. We encourage the Agency to alter its approach so as to bring about more orderly water pollution control programs under the law.

Sincerely,

W. J. Driver

[6500] January 15, 1974

Mr. W. J. Driver
President
Manufacturing Chemists Association
1825 Connecticut Avenue, N.W.
Washington, D. C. 20009

Dear Mr. Driver:

The Administrator has asked me to respond to the comments of your Association which request that the Agency redirect its approach to establishing effluent limitations guidelines pursuant to sections 301 and 304 of the Federal Water Pollution Control

Act, as amended. While there are difficulties in establishing these guidelines because of the complexity not only of the language of the Act but also the large number of plants within the same industrial categories, I am unable to agree with your reading of the Act that the Environmental Protection Agency (EPA) is proceeding in an unjustified manner.

You have suggested that our procedures for adopting the effluent guidelines violate the Administrative Procedure Act, and that adjudicatory hearings should be provided. The Administrative Procedure Act, however, requires that formal hearings precede administrative rulemaking only "when rules are required by statute to be made on the record after opportunity for an agency hearing. . . ." 5 U.S.C. § 553(c). Since sections 301, 304 and 306 of the FWPCA do not require a hearing at all, let alone require that the decision be made on the record after opportunity for hearing, I believe that there is no basis for your contention that we should provide an adjudicatory hearing. This position has been affirmed in recent Supreme Court decisions. See *United States* v. *Allegheny–Ludlum Steel Corporation*, 406 U.S. 742 (1972), and *United States* v. *Florida East Coast Railway Company*, 410 U.S. 224 (1973). I also call your attention to the case of *The Anaconda Company* v. *Ruckelshaus*, 432 F. 2d 1301 (10th Cir. 1973), which holds that an adjudicatory hearing is not required merely because the rulemaking is directed toward a limited number of sources.

With respect to whether EPA should specify that the guidelines are only guidance and are not mandatory in the issuance of permits, which [6501] would allow at the time of issuance of a permit an opportunity to determine the reasonableness of a particular effluent limitation on the basis of the individual plant situation, it is our opinion that such an approach would contradict the clear requirements of the Act. The basic approach of the Act is to achieve nationally uniform standards so that polluters may not derive unfair economic advantage by locating in States with lax enforcement procedures. This uniformity would be lost if individual cost-based variances could be granted, particularly when the standards may be applied through a permit program administered by a State

which may have different attitudes towards variance applications. For this reason, the guidelines must establish nationally uniform limitations to be implemented by the permit system rather than allowing individual determinations at the time of each permit application. Congress certainly made no reference in either section 304 or section 402 that the factors to be considered in setting effluent standards, which are described in section 304, are also to be applied when issuing individualized permits under section 402. It should be pointed out that section 402(a)(1), in listing the conditions to be imposed in all permits issued under that section, contains no reference to section 304 although several other sections are specifically enumerated. Moreover, many of the factors specified in section 304 clearly only make sense if they are to be considered on an industry-wide basis, *e.g.*, total cost of technology in relation to effluent reduction benefits, and non-water quality environmental impact, including energy requirements.

In fact, where Congress did intend that there be a permit-by-permit analysis of the individual problems of particular discharges, it expressly provided for this. Section 301(c) provides for an individual variance from the 1983 standard based on economic capabilities of the individual discharger and section 302(b)(2) provides for a specific variance from water quality requirements based on cost-benefit balancing. Similar opportunity for individual variances relating to the discharge of thermal pollutants is provided for in section 316(a). The failure of Congress similarly to provide for this type of individualized analysis in section 402 cannot be ignored.

Finally, the legislative history confirms EPA's interpretation:

> The conferees intend that the Administrator or the State, as the case may be, will make the determination of the economic impact of an effluent limitation on the basis of classes and categories of point sources, as distinguished from a plant by plant determination. However, after July 1, 1977, the owner or operator of a plant may seek relief from [6502] the requirement to achieve effluent limitations based on best available technology economically achievable. S. Rep. No. 92-1236, 92nd Cong., 2nd Sess., 121 (1972).

Senator Muskie submitted a statement that was even more explicit: "The conferees intend that the factors described in section 304(b) be considered only within classes or categories of point sources and that such factors not be considered at the time of the application of an effluent limitation to an individual point source within such a category or class. Vol. I, *Legislative History*, p. 172.

One final comment from the legislative history is also relevant. With respect to whether the guidelines should establish percentage effluent reductions which are achievable, rather than specific effluent limitations, the conference committee specifically provided that:

> "Except as provided in section 301(c) of this Act, the intent of the Congress is that effluent limitations applicable to individual point sources within a given category or class be as uniform as possible. The Administrator is expected to be precise in his guidelines under subsection (b) of this section, so as to assure that similar point sources with similar characteristics, regardless of their location or the nature of the water into which the discharge is made, will meet similar effluent limitations." S. Rep. No. 92-1236, 92nd Cong., 2nd Sess., 126 (1972).

In addition, you question the validity of EPA establishing production-based guidelines. While the Act does not speak to the exact format the guidelines are to take, it certainly does not preclude expressing effluent limitations in terms of an amount of pollutant which may be discharged for a corresponding amount of end product produced. The legislative history confirms that Congress anticipated that this would in fact occur: "In no case, however, should any plant be allowed to discharge more pollutants *per unit of production* than is defined by that base level." (emphasis added) S. Rep. No. 92-414, 92nd Cong., 1st Sess., 50 (1971). Whether such approach is inappropriate with respect to any particular industry or sub-category of industries is, of course, a factual matter but it is not, as you suggest, an indefensible approach to setting the standards. Any objections you have to a particular category or sub-category should be made with reference to your comments on the proposed guidelines.

Finally, I would like to discuss what I perceive to be your interpretation that since Congress did not specifically provide for "no discharge" until [6503] at least 1983, EPA is precluded by the statute from requiring this degree of control in 1977. It is the position of EPA that the intent of Congress was to clean up the waters of this country as soon as possible with a goal of achieving total elimination of all discharges no later than 1985. In establishing the two-phase approach to implementing the no-discharge goal, Congress acknowledged the fact that certain industries could not proceed as rapidly as others and thus tempered its requirements for prompt action toward achieving no discharge by providing interim goals which consider the economic and technological problems in relation to the time frame permitted for compliance.

However, in no way do we consider this to mean that the criteria established by Congress to define "best practicable control technology" preclude achievement of "no discharge" by 1977. In establishing the "best practicable control technology," EPA may determine that a no-discharge limitation is in fact "practicable" by 1977 as that degree of limitation is defined in the Act; such a determination—if supported by the facts—does not mean that EPA has established a "best available control technology" standard for 1977, as you suggest.

I believe that this approach carries out the intent of Congress as indicated by the comments of the major participants in the adoption of the 1972 Amendments. Senator Muskie, in the debates on the conference bill, made it very clear that while polluters were to achieve "best practicable technology" by 1977, this did not mean the Administrator could not require compliance by an earlier date. And the same applied to the Phase II "best available technology," with respect to which he said: "The Administrator retains the authority to require the application of these controls at an earlier date, and it is intended that he will require their application at the soonest practicable time." Vol. 2, *Legislative History*, pp. 162-3. It is therefore clear that Congress intended discharges of pollutants to be eliminated as soon as possible within the limitations prescribed in sections 301 and 304. Moreover, this approach is a

sound one from a practical standpoint as well because the deadlines established by the Act are outside dates—the specified degree of reduction must be achieved "not later than" 1977 and "not later than" 1983—and any limitation which can be achieved by a particular source prior to those dates will also result in an improvement of water quality during the interim period, which is certainly within the spirit of the Act. See Section 101(a).

In establishing the guidelines for "best practicable control technology" to be applied in 1977, EPA has applied the criteria specified in sections 301(b)(1)(A) and 304(b)(1) and has determined that in some instances those criteria, although less stringent than the criteria [6504] established for the guidelines in 1983, indicate that no discharge is practicable for certain sources in 1977. EPA has not, as you indicated, ignored the requirements of section 301(b)(2). Those requirements were simply inapplicable to those situations. While you may disagree that EPA's conclusions are justified on the basis of the information available, *i.e.* whether the proper economic, technological, and process factors have been adequately considered, that disagreement does not provide evidence of any misinterpretation of the requirements of the Act by EPA (*i.e.* requiring "best available technology" in 1977). It is solely a technical disagreement with the adequacy of the information to support, within the specified parameters, a finding that no discharge is in fact "practicable." However, a detailed discussion of the basis for those findings is neither relevant nor appropriate to properly respond to the questions you have raised at this time.

With respect to this general subject, I would make one final comment. I feel that your position that a no-discharge standard is only to be required in 1983 is untenable from a policy standpoint as well as a legal one because this approach would often require EPA to permit in 1977 a degree of effluent reduction which would be less stringent than the facilities are capable of doing and would perhaps in some instances reward those sources which have failed to invest in pollution abatement equipment even though it was available. As the legislative his-

tory indicates, Congress clearly envisioned that in 1977, the Administrator could require technology that was not widely in use if it were available and if control practices in the industry were uniformly inadequate. It would be an untenable position for EPA to have to require a lesser degree of control than "no discharge" despite the total availability of control equipment to achieve that limitation at a reasonable cost for the affected industry, merely on the premise that EPA could not require such a degree of control until 1983. As long as the no-discharge standard is justified on the basis of the criteria specified by Congress to be considered in 1977, EPA has the authority to prescribe that degree of control.

Sincerely yours,

Alan G. Kirk, II
Assistant Administrator for
Enforcement and General Counsel (EG-329)

* * * *

JUDICIAL FROCEEDINGS

In the United States Court of Appeals

FOR THE FOURTH CIRCUIT

E. I. du Pont de Nemours and Co.
1007 Market Street
Wilmingtor, Delaware 19898

Petitioner,

v.

Russell E. Train, as Administrator,
Environmental Protection Agency
401 M Street, S.W.
Washington, D. C. 20460

Respondent.

PETITION FOR REVIEW

No. 74-1261

The aforenamed petitioner hereby petitions the Court to review and set aside the Order of the Administrator of the Environmental Protection Agency, dated March 4, 1974, promulgating regulations establishing effluent guidelines for the Inorganics Chemicals Manufacturing Point Source Category under the authority of Section 304(b) of the Federal Water Pollution Control Act, as amended, 33 U.S.C. § 1314(b). The regulations are additions to 40 C.F.R. Chapter I, Subchapter N, Part 415 (39 Fed. Reg. —, March –, 1974).

Respectfully submitted,

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MARCH 5, 1974

In the United States Court of Appeals

FOR THE FOURTH CIRCUIT

DOW CHEMICAL COMPANY
Midland, Michigan 48640

UNION CARBIDE CORPORATION
270 Park Avenue
New York, New York 10017

MONSANTO COMPANY
800 North Lindbergh Boulevard
St. Louis, Missouri 63166

HERCULES INCORPORATED
Wilmington, Delaware 19899

Petitioners,

v.

RUSSELL E. TRAIN, as Administrator,
Environmental Protection Agency
401 M Street, S.W.
Washington, D. C. 20460

Respondent.

PETITION FOR REVIEW

The aforenamed petitioners hereby petition the Court to review and set aside the Orders of the Administrator of the Environmental Protection Agency, dated March 4, 1974, and January 22, 1974, promulgating regulations establishing effluent guidelines for the Inorganics Chemicals Manufacturing Point Source Category and establishing general provisions for effluent guidelines insofar as applicable to effluent guidelines for the Inorganic Chemicals Manufacturing Point Source Category. Such regulations were promulgated under the authority of Section 304(b) of the Federal Water Pollution Control Act, as amended, 33 U.S.C. § 1314(b). The regulations are additions to 40 C.F.R. Chapter I, Subchapter N, Parts 415 (39 *Fed.*

Reg. —, March 12, 1974) and 401 (39 *Fed. Reg.* 4532, February 4, 1974).

Respectfully submitted,

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MARCH 12, 1974

In the United States Court of Appeals

FOR THE FOURTH CIRCUIT

FMC CORPORATION
1617 John F. Kennedy Boulevard
Philadelphia, Pennsylvania 19103

Petitioner,

v.

RUSSELL E. TRAIN, as Administrator,
Environmental Protection Agency
401 M Street, S.W.
Washington, D. C. 20460

Respondent.

PETITION FOR REVIEW

The aforenamed petitioner hereby petitions the Court to review and set aside the Orders of the Administrator of the Environmental Protection Agency, dated March 4, 1974, and January 22, 1974, promulgating regulations establishing National Standards of Performance for New Sources in the Inorganics Chemicals Manufacturing Point Source Category and establishing general provisions for Standards of Performance insofar as applicable to Standards of Performance for the Inorganic Chemicals Manufacturing Point Source Category. Such regulations were promulgated under the authority of Section 306 of the Federal Water Pollution Control Act, as amended, 33 U.S.C. § 1316. The regulations are additions to 40 C.F.R. Chapter I, Subchapter N, Parts 415 (39 *Fed. Reg.* —, March 12, 1974) and 401 (39 *Fed. Reg.* 4532, February 4, 1974).

Respectfully submitted,

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MARCH 12, 1974

In the United States District Court

FOR THE WESTERN DISTRICT OF VIRGINIA

E. I. du Pont de Nemours and Co.
Wilmington, Delaware 19898
(302) 774-1000

Olin Corporation
120 Long Ridge Road
Stamford, Connecticut 06904
(203) 356-2000

FMC Corporation
1617 John F. Kennedy Boulevard
Philadelphia, Pennsylvania 19103
(215) 564-1600

American Cyanamid Company
Wayne, New Jersey 07470
(201) 831-1234

Monsanto Company
800 North Lindbergh Boulevard
St. Louis, Missouri 63166
(314) 694-1000

The Dow Chemical Company
Midland, Michigan 48640
(517) 636-1000

Allied Chemical Corporation
Morristown, New Jersey 07960
(201) 455-2000

Hercules, Incorporated
Wilmington, Delaware 19899
(302) 656-9811

Plaintiffs,

v.

Russell E. Train, as Administrator,
Environmental Protection Agency
401 M Street, S.W.
Washington, D. C. 20460

and

John R. Quarles, as Deputy Administrator,
Environmental Protection Agency
401 M Street, S.W.
Washington, D. C. 20460

Defendants.

Civil Action No.

74-57

COMPLAINT FOR DECLARATORY JUDGMENT AND INJUNCTIVE RELIEF

I

DESCRIPTION

1. This action is brought to review and suspend, enjoin, annul and set aside the Orders and Regulations promulgated by the Administrator of the Environmental Protection Agency as 40 C.F.R. §§ 415.210, 415.211, 415.212, and 415.213, 39 *Federal Register* 9611, 9623-24 (March 12, 1974), and as 40 C.F.R. §§ 401.10, 401.11, and 402.12, 39 *Federal Register* 4532 (February 4, 1974) insofar as applicable to 40 C.F.R. §§ 415.210 through 415.213; and, in connection therewith, for a judgment declaring that the regulations issued pursuant to such Orders constitute effluent guidelines under Sections 304(b)(1) and (2) of the Federal Water Pollution Control Act, as amended, 33 U.S.C. § 1314(b)(1) and (2), that such regulations are subject to review in this Court and not subject to review under Section 509(b) of the Act, 33 U.S.C. § 1369(b), and that Plaintiffs are not required by law to institute proceedings for judicial review of such regulations within 90 days from promulgation. The Orders and Regulations, attached hereto as Exhibit A, are identified as "Effluent Limitation Guidelines for Existing Sources . . . for the Inorganic Chemicals Manufacturing Point Source Category" and as "Effluent Guidelines and Standards-General Provisions." 40 C.F.R. §§ 415.210 to 415.213 is entitled "Effluent limitation guidelines representing the degree of effluent reduction attainable by application of the best practicable control technology currently available" and apply to the Sulfuric Acid Production Subcategory and are hereinafter referred to as the "Effluent Guidelines."

II

PLAINTIFFS

2. E. I. du Pont de Nemours and Company is a corporation organized and existing under the laws of the State of Delaware and does business in the State of Virginia.

3. Olin Corporation is a corporation organized and existing under the laws of the State of Virginia and does business in the State of Virginia.

4. FMC Corporation is a corporation organized and existing under the laws of the State of Delaware and does business in the State of Virginia.

5. American Cyanamid Company is a corporation organized and existing under the laws of the State of Maine and does business in the State of Virginia.

6. Monsanto Company is a corporation organized and existing under the laws of the State of Delaware and does business in the State of Virginia.

7. The Dow Chemical Company is a corporation organized and existing under the laws of the State of Delaware and does business in the State of Virginia.

8. Allied Chemical Corporation is a corporation organized and existing under the laws of the State of New York and does business in the State of Virginia.

9. Hercules, Incorporated, is a corporation organized and existing under the laws of the State of Delaware and does business in the State of Virginia.

10. Each Plaintiff is a manufacturer of inorganic chemicals or other products at plant locations which are or will be subject to effluent guidelines promulgated or to be promulgated by the Environmental Protection Agency under Section 304(b) of the Act.

11. Plaintiffs E. I. du Pont de Nemours and Company, Olin Corporation, American Cyanamid Company, Monsanto Company, and Allied Chemical Corporation, among others, will be adversely affected by the Effluent Guidelines because, among other things, each is a manufacturer and seller of sulfuric acid at one or more plants from which liquid effluent is discharged into the navigable waters of the United States and the Effluent Guidelines, as promulgated by Defendant, require wrongful, illegal and undue control of such effluents.

12. Those and other Plaintiffs will be adversely affected by such Effluent Guidelines because, among other things, they purchase sulfuric acid and such Effluent Guidelines will limit the availability, result in increased price, and/or lower the quality of sulfuric acid.

III

DEFENDANTS

13. Defendant Russell E. Train is Administrator of the United States Environmental Protection Agency. The Administrator is charged by Section 101(d) of the Act with administering the Act, including Section 304(b).

14. Defendant John R. Quarles is Deputy Administrator of the Environmental Protection Agency and, at times pertinent, has assumed the position of Acting Administrator.

IV

JURISDICTION

15. The jurisdiction of this Court is invoked under the provisions of 28 U.S.C. §§ 1331, 1332, 1337, 1361 and 1651; by the Declaratory Judgment Act, 28 U.S.C. §§ 2201-2202 and by Section 10 of the Administrative Procedure Act, now codified at 5 U.S.C. §§ 701-706, especially 5 U.S.C. § 702. The amount in controversy exceeds $10,000, exclusive of interests and costs.

V

VENUE

16. The venue of this proceeding is in this Court by virtue of the provisions of 28 U.S.C. § 1391(e)(4). The residence of Plaintiff Olin Corporation is the State of Virginia; it is a corporation organized and existing under the laws of the State of Virginia.

VI

THE FEDERAL WATER POLLUTION CONTROL ACT

17. The Federal Water Pollution Control Act, as amended (The "Act"), 33 U.S.C. §§ 1251 *et seq.*, was substantially

rewritten by The Federal Water Pollution Control Act Amendments of 1972, which were passed by Congress on October 18, 1972, over the veto of the President. Pub. L. 92-500, 86 Stat. 816.

18. As amended, the Act establishes the following regulatory scheme:

(a) Section 301(a) of the Act, 33 U.S.C. § 1311(a), bars or makes illegal "the discharge of any pollutant by any person," except where the person complies with certain specifically mentioned sections of the Act. Among these sections is Section 402 of the Act, 33 U.S.C. § 1342, authorizing the Administrator to "issue a permit for the discharge of any pollutant, or combination of pollutants, notwithstanding Section 301(a)," where the discharge meets the requirements of specified sections of the Act, including Section 301. Section 301(b) requires, among other things, the achievement by July 1, 1977, of "*effluent limitations* for point sources . . . which shall require the application of the best practicable control technology currently available as defined by the Administrator pursuant to Section 304(b) of this Act" and achievement by July 1, 1983, of "*effluent limitations* for categories and classes of point sources . . . which . . . shall require application of the best available technology economically achievable for such category . . . as determined in accordance with regulations issued by the Administrator pursuant to Section 304(b)(2) of this Act." (Emphasis added.)

(b) Section 304(b) (33 U.S.C. § 1314(b)) refers to guidelines for the adoption of effluent limitations as follows:

> "(b) *For the purpose of adopting or revising effluent limitations under this Act the Administrator shall,* after consultation with appropriate Federal and State agencies and other interested persons, *publish within one year of enactment of this title, regulations, providing guidelines for effluent limitations,* and, at least annually thereafter, revise, if appropriate, such regulations. Such regulations shall—
>
> "(1)(A) identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable

through the application of the best practicable control technology currently available for classes and categories of point sources (other than publicly owned treatment works); and

" (B) *specify factors to be taken into account in determining the control measures and practices to be applicable to point sources* (other than publicly owned treatment works) *within such categories or classes.* Factors relating to the assessment of best practicable control technology currently available to comply with subsection (b) (1) of section 301 of this Act shall include consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application, and shall also take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate;

"(2)(A) identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants the degree of effluent reduction attainable through the application of the best control measures and practices achievable including treatment techniques, process and procedure innovations, operating methods, and other alternatives for classes and categories of point sources (other than publicly owned treatment works); and

" (B) *specify factors to be taken into account in determining the best measures and practices available to comply with subsection (b)(2) of section 301 of this Act to be applicable to any point source* (other than publicly owned treatment works) *within such categories or classes.* Factors relating to the assessment of best available technology shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate; and

"(3) identify control measures and practices available to eliminate the discharge of pollutants from categories and classes of point sources, taking into account the cost of achieving such elimination of the discharge of pollutants." (Emphasis added.)

(c) Section 304 is not specified either in Section 301 as authorizing issuance of an "effluent limitation" with which compliance must be achieved before a discharge can become legal, or in Section 402 as providing authority for establishment of an "effluent limitation" which must be included in a permit authorizing a discharge.

19. Section 509(b) of the Act, 33 U.S.C. § 1369(b), provides for judicial review of certain specified actions of the Administrator:

(a) Section 509(b)(1), 33 U.S.C. § 1369(b)(1) emphasizes the distinction between effluent limitations on the one hand and guidelines for effluent limitations on the other, by providing that any interested person "may" obtain judicial review of the Administrator's actions "(E) in approving or promulgating any effluent limitations or other limitation under Section 301, 302, or 306 . . . in the Circuit Court of Appeals of the United States for the Federal judicial district in which such person resides or transacts such business" and that such actions shall be brought within 90 days from the date of promulgation or other Agency action. The Administrator's action in issuing guidelines under Section 304 is not included in Section 509's enumerated sections under which authority actions taken by the Administrator are to be reviewed in the Court of Appeals.

(b) Section 509(b)(2), 33 U.S.C. § 1369(b)(2), provides that "any action of the Administrator with respect to which review could have been obtained under paragraph (1) of this subsection shall not be subject to judicial review *in any civil or criminal proceedings for enforcement.*" (Emphasis added.) Section 509(b)(2) does not preclude subsequent judicial review of Effluent Guidelines in proceedings under Section 509(b)(1)(F) or any other proceedings other than a civil or criminal proceeding for enforcement.

VII

AGENCY PROCEEDINGS

20. Under date of June 1973, the General Technologies Corporation (hereinafter the "Contractor") submitted to the Environmental Protection Agency a document entitled "Draft Development Document for Effluent Limitations Guidelines and Standards of Performance–Inorganic Chemicals, Alkali and Chlorine Industries" (hereinafter "Contractor's Report"). The Contractor's Report, among other things, recommended effluent guidelines of "no discharge of process waste water" for sulfuric acid plants and purported to contain the data base supporting the recommendations.

21. On October 11, 1973, the Environmental Protection Agency published (38 *Federal Register* 28173, 28192) proposed regulations establishing effluent guidelines for the sulfuric acid production subcategory. The proposed effluent guidelines were "no discharge of process waste water pollutants." Shortly thereafter, the Agency made available documents entitled "Draft Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Major Inorganic Products Segment of the Inorganic Chemicals Manufacturing Point Source Category" (hereinafter "Draft Development Document") and "Economic Analysis of Proposed Effluent Guidelines–Inorganic Chemicals, Alkali, and Chlorine Industries (Major Products)" (hereinafter "Draft Economic Analysis").

22. On February 4, 1974, the Environmental Protection Agency published final regulations establishing general provisions applicable to effluent guidelines. 39 *Federal Register* 4532. Those Regulations, among other things, define "process waste water" and "process waste water pollutants." 40 C.F.R. § 401.10(q) and (r), 39 *Federal Register* 4532-33.

23. On March 12, 1974, the Environmental Protection Agency published final Effluent Guidelines for the Sulfuric Acid Production Subcategory. 39 *Federal Register* 9633.

24. The Effluent Guideline under Section 304(b)(1)(A) of the Act provides:

> § 415.212 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry sub-categorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NDPES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by

this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available: *There shall be no discharge of process waste water pollutants to navigable waters.* (Emphasis added.)

25. The Effluent Guideline under Section 304(b)(2)(A) provides:

> § 415.213 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.
>
> The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable: *There shall be no discharge of process waste water pollutants to navigable waters.* (Emphasis added.)

26. The Effluent Guidelines do not "specify factors to be taken into account in determining the control measures and practices to be applicable to point sources" (Section 304(b)(1)(B)) within the Sulfuric Acid Production Subcategory. The Effluent Guidelines do not "specify factors to be taken into account in determining best measure and practices available . . . to any point source" (Section 304(b)(2)(B)) within the Sulfuric Acid Production Subcategory.

27. The Preamble to the Regulations and Order establishing the Effluent Guideline states that "a manual entitled 'Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Major Inorganic Products Segment of the Inorganic Chemicals Manufacturing Point Source Category' has been published and is available for purchase from the Government Printing Office." To the best of Plaintiff's knowledge and belief, that document has not been published and is not available from the Government Printing Office.

28. Prior to and after publication of the proposed regulations establishing the Effluent Guidelines, interested persons, including Plaintiffs or their trade associations, submitted written comments on the Effluent Guidelines. Plaintiffs or their trade associations pointed out, among other things, that the Effluent Guidelines as recommended by the Contractor and proposed by the Environmental Protection Agency failed to take into account the factors required by the Act, that the effluent guidelines were not technically or economically practicable, that control costs and impact on the industry estimated in the Contractor's Report, the Draft Development Document and Draft Economic Analysis were materially understated, and that the certain data in the Contractor's Report, the Draft Development Document and Draft Economic Analysis were erroneous, inaccurate or inconsistent with data obtained by the Agency and/or its Contractor.

29. On September 25, 1973, the Effluent Standards and Water Quality Information Advisory Committee, an independent Advisory Committee established under Section 515 of the Act, 33 U.S.C. § 1374, submitted to the Administrator of the Environmental Protection Agency a Report concluding that the Agency's methodology for establishing effluent guidelines, including that for the inorganic chemical industry, was "un-scientific."

30. No public hearing, informal or formal, was held by the Environmental Protection Agency prior to promulgation of the Effluent Guidelines.

VIII

PLAINTIFFS' ALLEGATIONS

31. The Effluent Guidelines were promulgated under and by authority of Section 304(b) of the Act.

32. This Court has jurisdiction to review the Effluent Guidelines for Sulfuric Acid Production, a subcategory of the Inorganic Chemicals Manufacturing Point Source Category, and Section 509(b)(1) of the Act does not apply to Effluent Guidelines promulgated under Section 304(b).

33. The Effluent Guidelines, as promulgated, are arbitrary and capricious and beyond the statutory authority of the

Agency in that they purport to be or are said to have the effect of effluent limitations issued pursuant to Section 301 of the Act, 33 U.S.C. § 1311, whereas Section 304(b) of the Act authorizes only the issuance of guidelines to be considered in prescribing effluent limitations. Effluent limitations are to be established giving consideration to the guidelines, and implemented through the proceedings on an application for a discharge permit submitted pursuant to Section 402.

34. The Effluent Guidelines are unlawful, arbitrary and capricious, erroneous in law and not supported by substantial evidence, by evidence in the record, or adequate findings of fact, and are beyond the statutory authority of the Agency, in that, contrary to Section 304(b)(1)(B) and (2)(B), they fail to specify the factors to be taken into account in determining effluent limitations applicable to plants producing sulfuric acid in permit proceedings under Section 402.

35. The Effluent Guidelines are unlawful, arbitrary, capricious, vague, ambiguous, erroneous in law and not supported by substantial evidence, by evidence in the record or adequate findings of fact, and are beyond the statutory authority of the Agency for reasons set forth more fully below:

(a) The Agency failed to take into account adequately the factors required by Section 304(b)(1)(B) and (2)(B), particularly the effect of climate, the availability of land and geologic characteristics, age of plant, and type of process and operating conditions.

(b) The data contained in the record do not support the conclusions reached by the Agency in that, among other things, they are not representative of plants producing sulfuric acid.

(c) Certain data cited in the Development Document are erroneous, inaccurate and not supported by data collected by the Agency and/or the Contractor or provided by Plaintiffs and other persons.

(d) Certain conclusions reached by the Agency are erroneous in that they assume the applicability of control technology not currently applied or demonstrated without adequate consideration of the circumstances under which such technology may be applied.

(e) Costs of effluent control estimated by the Agency are erroneous in that they understate the direct costs of control and fail to account for costs, such as storm water runoff control and protection of groundwater, necessary and ancillary to direct control.

36. Defendant's promulgation of the Effluent Guidelines was arbitrary and capricious and not in accordance with procedures required by the Act and the Administrative Procedure Act in that

(a) Defendant failed to hold a public hearing in connection with the proposed rulemaking.

(b) Defendant failed to provide an adequate statement of basis for the proposed and final promulgation, and failed to provide adequate reason, or any reason at all, for rejection of Plaintiffs' repeated objections to the Contractor's Report, the Draft Development Document and the proposed Effluent Guidelines.

(c) Defendant failed to make practicably available the data allegedly compiled by the Agency and/or its Contractor in support of the Effluent Guidelines.

WHEREFORE, Plaintiffs pray:

1. That judgment be entered declaring that this Court has jurisdiction to review the effluent guideline for the Sulfuric Acid Production Subcategory, and that Section 509 of the 1972 Act is not applicable to judicial review of effluent guidelines promulgated under and by authority of Section 304(b) of the Act.

2. That judgment be entered declaring that the Effluent Guidelines, as specified in Section 304(b), are not effluent limitations and are guidelines to be used, in the discretion of the authorized permit-granting agency, in prescribing effluent limitations to be applied to individual plants (point sources) in permit proceedings under Section 402 in accordance with

factors set forth in Section 304(b)(1)(B) and (b)(2)(B) of the Act.

3. That judgment be entered to suspend, enjoin, annul and set aside the Effluent Guidelines, to enjoin Defendants from using or applying the Effluent Guidelines under Section 402 of the Act, and to remand said Effluent Guidelines to Defendants for promulgation of Effluent Guidelines in accordance with the statute, specifying the factors to be taken into account in determining effluent limitations applicable to plants producing sulfuric acid.

4. That Plaintiffs have such other and further relief as this Court may deem just and proper.

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105 Franklin Road, S.W.
Roanoke, Virginia 24004

APRIL 1, 1974

United States District Court
FOR THE WESTERN DISTRICT OF VIRGINIA

Civ. A. No. 74-57

E. I. du PONT de NEMOURS AND COMPANY et al., Plaintiffs,

v.

RUSSELL E. TRAIN et al., Defendants.

September 27, 1974

Robert C. Barnard, Douglas E. Kliever, and Charles F. Lettow, Cleary, Gottlieb, Steen & Hamilton, Washington, D. C., John L. Walker, Jr., Woods, Rogers, Muse, Walker & Thornton, Roanoke, Va., for plaintiffs.

Bruce J. Chasan, Dept. of Justice, Washington, D. C., Leigh B. Hanes, Jr., U.S. Atty. for the Western District of Virginia, Roanoke, Va., for defendants.

OPINION AND ORDER

TURK, Chief Judge.

This suit is brought by eight chemical manufacturers seeking declaratory and injunctive relief against the Administrator and Deputy Administrator of the Environment Protection Agency (EPA). The case is presently before the court pursuant to plaintiffs' motion for partial summary judgment and declaratory judgment and the defendants' motion to dismiss for lack of subject matter jurisdiction or alternatively to stay the proceedings.

Plaintiffs ultimately seek to have this court enjoin and set aside certain regulations promulgated by the Administrator of the EPA governing the effluent discharge of sulfuric acid plants on grounds that they are arbitrary, capricious, not supported by substantial evidence, beyond

the statutory authority of EPA and not in accord with procedures of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. § 1251 et seq. ("The Act") and the Administrative Procedure Act. Resolution of these allegations requires factual determinations and they are accordingly not now ripe for disposition. However, plaintiffs also raise several issues of statutory construction not dependent upon factual determinations and which may result in the disposition of the case at this time. The following issues are now before the court for resolution:

1. Whether the Administrator of the EPA has the authority under section 301(b) of the Act to issue regulations establishing effluent limitations for sulfuric acid plants;

2. Whether the regulations in question conform to section 304(b) of the Act and the notice and public participation provisions of the Administrative Procedure Act; and

3. Whether this court has jurisdiction to review the regulations in question and the procedures by which they were promulgated, or whether as defendants contend, this suit should be dismissed for lack of subject matter jurisdiction.

THE STATUTE

The Federal Water Pollution Control Act Amendments of 1972, while technically amending the Federal Water Pollution Control Act of 1965, 33 U.S.C. § 1151 et seq., is in effect a comprehensive statute in its own right. Section 101(a) of the Act states as its objective "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters," and states as two of its goals "that the discharge of pollutants into the Navigable waters be eliminated by 1985" and "that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983." Of primary interest to this suit are sec-

tions 301, 304 and 402, which establish the regulatory framework for achieving the above goals and section 509(b)(1) providing for judicial review of the Administrator's actions.

Section 301(a) makes it unlawful for any person to discharge any pollutant except as in compliance with certain enumerated sections of the Act including section 301. Section 301(b) then states:

> "In order to carry out the objective of this Act, there shall be achieved—
>
> "(1)(A) not later than July 1, 1977, effluent limitations for point sources . . . (i) which shall require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 304(b) of this Act. . . .
>
> "(2)(A) not later than July 1, 1983, effluent limitations for categories and classes of point sources . . . which (i) shall require application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act, which such effluent limitations shall require the elimination of discharges of all pollutants if the Administrator finds, on the basis of information available to him (including information developed pursuant to section 315), that such elimination is technologically and economically achievable for a category or class of point sources as determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act. . . ."

Section 304(b) to which section 301(b) refers provides:

> "For the purpose of adopting or revising effluent limitations under this Act the Administrator shall, after consultation with appropriate Federal and State agencies and other interested persons, publish within one year of [enactment of this title], regulations, providing guidelines for effluent limitations, and at least annually thereafter, revise, if appropriate, such regulations. Such regulations shall—

"(1)(A) identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of the best practicable control technology currently available for classes and categories of point sources . . .; and

"(B) specify factors to be taken into account in determining the control measures and practices to be applicable to point sources . . . within such categories or classes. Factors relating to the assessment of best practicable control technology currently available to comply with subsection (b)(1) of section 301 of this Act shall include consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application, and shall also take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate;

"(2)(A) identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of the best control measures and practices achievable including treatment techniques, process and procedure innovations, operating methods, and other alternatives for classes and categories of point sources . . .; and

"(B) specify factors to be taken into account in determining the best measures and practices available to comply with subsection (b)(2) of section 301 of this Act to be applicable to any point source . . . within such categories or classes. Factors relating to the assessment of best available technology shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate; and

"(3) identify control measures and practices available to eliminate the discharge of pollutants from categories and classes of point sources, taking into account the cost of achieving such elimination of the discharge of pollutants."

The statutory scheme further provides for a national system of discharge permits known as the "National Pollutant Discharge Elimination System" (NPDES) to insure that the control levels established by the Act are achieved. Thus, section 402(a)(1) states:

"Except as provided in sections 318 and 404 of this Act, the Administrator may, after opportunity for a public hearing, issue a permit for the discharge of any pollutant, or combination of pollutants, notwithstanding section 301(a), upon condition that such discharge will meet either all applicable requirements under sections 301, 302, 306, 307, 308 and 403 of this Act, or prior to the taking of necessary implementing actions relating to all such requirements, such conditions as the Administrator determines are necessary to carry out the provisions of the Act."

Section 402(b-e) further provides that the permit issuing authority be given to the individual states which submit a program which meets the requirements of the Act, although the Administrator retains the power to prevent the issuance of a permit he deems to be "outside the guidelines and requirements of this Act." § 402(d)(2).

Section 509(b) provides for judicial review of the Administrator's determinations:

"(1) Review of the Administrator's action (A) in promulgating any standard of performance under section 306, (B) in making any determination pursuant to section 306(b)(1)(C), (C) in promulgating any effluent standard, prohibition, or treatment standard under section 307, (D) in making any determination as to a State permit program submitted under section 402(b), (E) in approving or promulgating any effluent limitation or other limitation under section 301, 302, or 306, and (F) in issuing or denying any permit under section 402, may be had by any interested person in the Circuit Court of Appeals of the United States for the Federal judicial district in which such person resides or transacts such business upon appli-

cation by such person. Any such application shall be made within ninety days from the date of such determination, approval, promulgation, issuance or denial, or after such date only if such application is based solely on grounds which arose after such ninetieth day.

"(2) Action of the Administrator with respect to which review could have been obtained under paragraph (1) of this subsection shall not be subject to judicial review in any civil or criminal proceeding for enforcement."

THE REGULATIONS

On August 6, 1973, the EPA published notice of proposed rulemaking "with respect to effluent limitations, guidelines, standards of performance and pretreatment standards for new sources." 38 Fed.Reg. 21202. On October 11, 1973, EPA published notice of proposed rulemaking for 40 C.F.R. Part 415, "Effluent Limitations Guidelines and Standards of Performance and Pretreatment for Inorganic Chemicals Manufacturing Point Source Category." 38 Fed.Reg. 28174 et seq. These proposed regulations subdivided the inorganic chemicals manufacturing category into twenty-two sub-categories, each representing a different chemical, including sulfuric acid. With respect to sulfuric acid, the proposal discussed the three principal methods of manufacture—double absorption plants, single absorption plants and spent acid plants—and stated that the proposed regulations would not apply to spent acid plants. However, the proposed regulations for both single and double absorption plants established the standard of "no discharge of process waste water pollutants to navigable waters" both "after application of the best practicable control technology currently available" and "after application of the best available technology economically achievable." 38 Fed.Reg. 28192. After receiving additional comments, including comments from seven of the plaintiffs to this suit, 39 Fed.Reg. 9612, final regulations were issued on March 12, 1974 for 40 C.F.R. Part 415 (Inorganic Chemicals Manufacturing Point Source Category). The Administrator declined to change the basic proposed regulations for sulfuric acid production, and the "no discharge of process waste water pollutants" went into effect. 40 C.F.R. §§ 415.212, 415.213, 39 Fed.Reg. 9634. The proposed regulations for sulfuric acid production (as well as other subcategories in the Inorganic Chemicals Manufacturing Group) were modified with regard to the limitations representing best practicable control technology currently available (40 C.F.R. § 415.212), by providing that the "no discharge" standard might be adjusted for certain plants by the Regional Administrator or the State in issuing an NPDES permit; according to the regulation, such an adjustment could be made on the basis of a showing that certain factors peculiar to the discharger are "fundamentally different" than the factors considered in formulating the regulation. 40 C.F.R. § 415.212, 39 Fed.Reg. 9634.

I

Plaintiffs' statutory construction argument is essentially that the regulations for sulfuric acid plants are not valid effluent "guidelines" complying with the requirements of section 304(b). They contend that the word "guidelines" in section 304(b) is a term of art which contemplates the administrative promulgation of broadly outlined regulations to serve as a starting point for the development of specific restrictions which would then be individualized for each discharger by way of permits issued by the Regional Administrator or State pursuant to § 402 with such permits embodying the "limitations" to be "achieved" pursuant to § 301. In support of this construction plaintiffs note that § 304(b) requires that the guidelines to be published as regulations contain two elements: (1) the degree of effluent reduction "attainable" by 1977 using the "best practicable control technology currently available" and by 1983 using the "best available control measures and practices achievable" for classes and categories of

point sources; and (2) a specification of the factors to be taken into account in determining the control measures applicable to point sources within such categories or classes in order to attain these goals. Thus plaintiffs argue that the regulations were intended to be flexible guidelines and not prescriptive rules applicable across the board to all plants in a given category (i. e. sulfuric acid plants); and the permit granting agency would look to the guidelines for determining the degree of effluent limitation attainable for a given plant.

Plaintiffs specifically contend that the regulations for sulfuric acid plants fail to discuss the statutory factors and hence provide no guidance to the permit-granting authorities. Furthermore, they contend that the EPA's construction and implementation of the Act would frustrate the intent of Congress in allowing the States to play a major role in implementing the Act. They argue that by making the regulations binding prescriptions in the form of specific limitations instead of a "range" of discharge levels together with factors to be taken into account for discrete industrial categories, the EPA has deprived the States of discretion in administering the NPDES program. This is said to be contrary to the intent of Congress expressed in § 101(b) of the Act "to recognize, preserve, and protect the primary responsibilities and rights of the States to prevent, reduce, and eliminate pollution. . . ."

Based on their construction of the Act, plaintiffs then contend that review in the Court of Appeals pursuant to § 509(b)(1) of the Act is not available to challenge the regulations constituting effluent guidelines under § 304(b). Since § 509(b) provides only for review of EPA actions under sections 301, 302, 306, 307 and 402 of the Act, review of other regulatory actions by the EPA as well as certain other agencies empowered to act under the Act would proceed under the Administrative Procedure Act, 5 U.S.C. § 702, and through other jurisdictional statutes such as

the Mandamus and Venue Act of 1962, 28 U.S.C. § 1361.[1] Thus plaintiffs argue that review of § 304(b) guidelines is not encompassed by § 509(b). In support of this position, plaintiffs point out that each of the sections specified in § 509(b) allow regulatory actions by the EPA which may then be enforced by the Administrator pursuant to § 309 or by "any citizen" pursuant to § 505 by way of a civil suit in the district court. They argue that actions taken pursuant to sections not specified in § 509(b), including guidelines issued pursuant to § 304(b), require further implementing steps, and hence a decision of broad precedential effect by a Court of Appeals was not deemed necessary in the first instance.

In contrast, defendants contend that the Act contemplates that the Administrator promulgate actual effluent limitations which will then be uniformly applied by the Administrator or the states in issuing NPDES permits under section 402. According to their construction, section 304(b) guidelines have no direct relationship to permit proceedings under section 402, but merely provide a basis for establishing the effluent limitations. They accordingly argue that the regulations are effluent limitations properly established pursuant to section 301(b).

Defendants view the regulations in question, 45 C.F.R. §§ 415.212, 415.213, as valid effluent limitations promulgated pursuant to section 301(b) with the fixed number of zero for the discharge of process waste water from sulfuric acid plants being the established limitation. In addition they contend that 45 C.F.R. Part 415 establish the "guidelines" required by section 304(b) by subdividing the inorganic chemical manufacturing group into 22 sub-

[1] As a basis for jurisdiction to review what they consider to be section 304(b) "guidelines" plaintiffs also cite 28 U.S.C. §§ 1331, 1332, 1337 and 1651; the Declaratory Judgment Act, 28 U.S.C. §§ 2201-2202; and the Administrative Procedure Act, 5 U.S.C. §§ 701-706.

categories of specific chemicals.[2] Thus defendants contend that the regulations are "guidelines" issued pursuant to section 304(b) by way of subcategorization, but are effluent limitations in terms of the specific numerical restrictions imposed.

On the basis of this construction, defendants argue that jurisdiction to review the regulations is exclusively in the Court of Appeals pursuant to section 509(b)(1)(E). Furthermore, it is asserted that since the "guidelines" are intertwined with and provide a definitional basis for the limitations, they should also be reviewed in the Court of Appeals.

II

The issue of statutory construction presented in this case is one of first impression[3] in which the court must seek the intent of Congress from the words and structure of the statute and its legislative history. Although the varying interpretations of the Act presented by the parties both find support in the statute and its history, for the reasons which follow the court concludes: (1) that the Administrator was authorized to promulgate by regulation the

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[2] The Administrator's approach was explained in the regulations as follows:

> The approach taken in developing effluent limitations guidelines and standards of performance for the inorganic chemicals manufacturing industry was to examine all variables and segment the industry into workable subcategories consistent with these variations. Twenty-two subcategories have been established based on the chemical product manufactured. In cases where two dissimilar processes are used to manufacture the same product separate limitations have been established within the subcategory. Thus, ranges are provided for, as are other factors, by segmenting the inorganic chemicals manufacturing point source category into discrete subcategories, each with its own limitation. 39 Fed.Reg. 9612 (March 12, 1973).

[3] Plaintiffs cite Natural Resources Defense Council v. Train, 6 E.R.C. 1033 (D.D.C. 1973) in support of their construction of the Act. That case involved a suit to compel the Administrator to publish effluent limitation guidelines after expiration of the time period established by the Act. However, that case did not consider the issue of statutory construction now presented.

effluent limitations in issue; (2) that the structural and content requirements of such regulations under section 304(b) were satisfied; and (3) that judicial review of these limitations and guidelines is exclusively in the Court of Appeals under section 509(b)(1)(E).

1.

[1] Taken as a whole, the various sections of the Act support the defendants' construction that section 301(b) effluent limitations were intended to be promulgated as regulations apart from section 402 permit proceedings. This is implicitly supported by section 509(b)(1)(E) which provides for review of the Administrator's actions "in approving or promulgating any effluent limitation or other limitation under section 301, 302, or 306. . . ." The independence of such limitations is also implicit in section 505 which provides in subsection (a) for any citizen to sue for a violation of "an effluent standard or limitation under this Act"; but even more revealing is section 505(f) which defines "effluent standard or limitation under this Act" to include six separate definitions among which are: "(1) effective July 1, 1973, an unlawful act under subsection (a) of section 301 of this Act, (2) an effluent limitation or other limitation under section 301 or 302 of this Act; . . ." or (6) "a permit or condition thereof issued under section 402 of this Act. . . ." Obviously under plaintiffs' construction of the Act the second definition quoted above would be redundant with the sixth. Plaintiffs have offered no explanation for this apparent inconsistency with their position.

Plaintiffs would avoid the implication of section 509(b)(1)(E) by construing the word "promulgating" in section 509(b)(1)(E) as applying only to section 302 and the word "approving" as having application to effluent limitations under sections 301 or 306. In support of this construction, plaintiffs point out that section 402(b) allows a state to develop a plan for issuing permits and thus displace the Administrator's authority to issue permits; and further that section 402(d) provides a check on the states

by allowing the Administrator to veto a permit issued by the state:

> "(d)(1) Each State shall transmit to the Administrator a copy of each permit application received by such State and provide notice to the Administrator of every action related to the consideration of such permit application, including each permit proposed to be issued by such State.
>
> "(2) No permit shall issue . . . (b) if the Administrator within ninety days of the date of transmittal of the proposed permit by the State objects in writing to the issuance of such permit as being outside the *guidelines and requirements of this Act.* (plaintiffs' emphasis).

From these sections, plaintiffs argue that the use of "approving" in section 509(b)(1)(E) was in reference to the Administrator's action in reviewing effluent limitations under section 301(b) or standards of performance under section 306 [4] which would be set by the States in permits. They further contend that such approval was a necessary element inasmuch as such a federal connection to a state program was necessary in order to justify review in the federal courts. On the other hand, plaintiffs argue that section 302 [5] provides for the promulgation of effluent

[4] Section 306(b) provides that the Administrator shall publish regulations "establishing Federal standards of performance for new sources" within a category of sources. Plaintiffs point out that section 509(b)(1)(A) specifically provides for review of these "standards of performance." Section 306(c) authorizes the states to develop a procedure for applying and enforcing standards of performance for new sources located within the state which may then be approved by the Administrator. Plaintiffs contend that the implementation of these standards of performance would occur in permit proceedings which would be subject to approval by the Administrator in a manner similar to section 301(b) effluent limitations.

[5] Section 302(a) authorizes the Administrator to "establish" "water quality" related "effluent limitations" when he finds that

> "discharges of pollutants from a point source or group of point sources, with the application of effluent limitations required under section 301(b)(2) (the technology-based limitations to be achieved by 1983), would interfere with the attainment or maintenance of that water quality in a specific portion of the navigable waters which shall assure protection of public water supplies. . . ."

limitations by the Administrator in certain defined situations without a provision for state implementation. This is said to explain the use of "promulgating" in section 509(b)(1)(E).

Such a construction of section 509(b)(1)(E) is unconvincing for several reasons. First, section 302 does not require that effluent limitations be "promulgated"; rather it states that "effluent limitations . . . shall be established." The court fails to see a distinction between the establishment of limitations under section 302 and the achievement of limitations under section 301(b) particularly in view of the language used in section 301(e):

> "Effluent limitations, established pursuant to this section or section 302 of this Act shall be applied to all point sources of discharge of pollutants in accordance with the provisions of this Act."

Similarly section 302(c) provides:

> "The establishment of effluent limitations under this section shall not operate to delay the application of any effluent limitation established under section 301 of this Act."

Second, plaintiffs' construction of the interrelationship between section 509(b)(1)(E) and section 402(d)(1) and (2) ignores the fact that sections 402(d)(3), 402(e) and 402(f) allow the Administrator to waive review of permits issued by the States, and thus in such situations, by plaintiffs' analysis, there would be no federal judicial review under section 509(b)(1). Finally, the reference to "guidelines and requirements of this Act" in section 402(d)(2) would appear to be section 304(h) guidelines [6] (as opposed to section 304(b) guidelines) in view of the references to "guidelines" in sections 402(b), 402(c)(1), and 402(c)(2) and 402(e) being specifically to section 304(h) guidelines.

Even more strongly suggestive of the conclusion that section 301(b) limitations were intended to be promulgated as regulations is the interrelationship between sec-

[6] These pertain to the procedural requirements of a state-operated permit program.

tion 301(b) and 304(b). Thus the requirements of sections 304(b)(1)(A) and 304(b)(2)(A) that the Administrator publish regulations which identify the degree of effluent reduction attainable by 1977 and 1983 appears to contemplate the issuance of actual effluent limitations which are referred to in section 301(b)(1)(A) as being "defined by the Administrator pursuant to section 304(b) of this Act" and in section 301(b)(2)(A) as being "determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act. . . ."

Both plaintiffs and defendants quote the definition of effluent limitation in section 502(11) in support of their respective interpretations of the Act:

> "The term 'effluent limitation' means any restriction established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance."

Plaintiffs argue that since a state cannot issue regulations the definition indicates that effluent limitations do not involve regulations and that the definition contemplates that both the states and the EPA will have a shared role in establishing effluent limitations. However, the court does not perceive this definition as being inconsistent with the defendants' construction of the Act and the regulations herein challenged since the effluent limitations promulgated by the Administrator may nevertheless be "established" for a given discharger through a permit issued by a state which has satisfied the requirements of section 402.

Further support for the conclusion that NPDES permits issued pursuant to section 402 would embody the effluent limitations previously established by the Administrator is implicit in the fact that section 402(a) requires that such permits meet the "applicable requirements under section 301" but omits any reference to section 304(b) guidelines.

[2] As noted, the regulations herein challenged establish the number of zero as the effluent limitation for both single and double absorption plants. The court is of the opinion from a consideration of the structure and wording of the Act that the Administrator had the authority to promulgate such limitations under section 301(b) pursuant to his authority under section 304(b). It follows that plaintiffs' substantive challenge to such limitations must be brought in the Court of Appeals pursuant to section 509(b)(1)(E).

2.

Plaintiffs further challenge the regulations in question for failing to specify the factors to be taken into account in determining the control measures and practices to be applicable to point sources within such categories or classes, as required by section 304(b)(1)(B) and 304(b)(2)(B). As noted, defendants argue that the subcategorization in effect establishes "guidelines" under section 304(b). They contend that variations in plant age, size, manufacturing processes, raw materials, etc. (section 304(b)(1)(B) and 304(b)(2)(B) factors) were taken into account by such subcategorization. They further argue that this approach is consistent with the statutory scheme and facilitates the achievement of reasonably uniform limitations for similar point sources under section 301 of the Act.

The court notes that although the factors were not set forth as regulations as such, the regulations do indicate that the factors were considered. The regulations in question also indicate that the effluent limitations established could be varied for an individual discharger in an NPDES permit upon a showing "that factors relating to the equipment or facilities involved, the processes applied or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. . . ." 39 Fed.Reg. 9634; 45 C.F.R. § 415.212. In addition, defendants assert (and the regulations note) that the factors in question are analysed in a "Development Document."

[3] In view of the aforementioned conclusion that sections 301(b) and 304(b) intend that the Administrator will publish effluent limitations for classes and categories of point sources, the court is of the opinion that the approach taken by the Administrator in specifying factors is in accord with section 304(b). In this regard it must be noted that the factors required to be specified under section 304(b) were not intended to exist in a vacuum. Rather, both sections 304(b)(1)(B) and 304(b)(2)(B) respectively require such factors in reference to "the assessment of best practicable control technology currently available to comply with subsection (b)(1) of section 301" and "the best measures and practices available to comply with subsection (b)(2) of section 301". Thus the statute appears to contemplate the incorporation of such factors in the effluent limitations established under section 301, which was apparently done in this case. Accordingly, the court believes that any challenge to the Administrator's consideration of various factors or the weight given to each, like the challenge to the actual numerical limitations, is in essence a challenge to the Administrator's action in promulgating effluent limitations under section 301 and must be pursued under section 509(b)(1)(E) in the Court of Appeals.

[4] The court further is of the opinion that section 509(b) is consistent with the above construction of the Act. It is reasonable to assume that by providing original judicial review in the Courts of Appeals of effluent limitations under section 509(b) along with strict time limitations and prohibitions on review by way of criminal or other civil proceedings, Congress sought to establish expeditious and consistent application of limitations.[7] However, by plaintiffs' construction of the Act, actual effluent limitations would always be individualized for dischargers in NPDES permits, thus limiting the broad precedential effect of any judicial decision approving or rejecting any such limitation. Furthermore, if plaintiffs could challenge section 304(b) guidelines in the district court and section 301(b) limitations in the Court of Appeals, this would create duplicative litigation because of the close interrelationship between these sections and the fact that the administrative record in each suit would be virtually identical. In addition, any successful challenge to guidelines in the district court would affect the limitations which could only be challenged in the Court of Appeals and would thus hinder the goal of prompt judicial review.

[7] There is very little legislative history relative to section 509(b). The bill as originally passed by the House provided for judicial review in the district courts whereas the Senate bill provided for review of certain administrative actions in the Court of Appeals for the District of Columbia and others in the Courts of Appeal for the appropriate circuit. H.R. 11896, 92d Cong., 2d Sess. § 509(b) (1972); S. 2770, 92d Cong., 1st Sess. § 509(b).

3.

The legislative history of the Act is generally consistent with the stated conclusions concerning the relationship between sections 301, 304 and 402 and the Administrator's authority to establish the effluent limitations in issue. Both the House Report accompanying H.R. 11896 and the Senate Report accompanying S. 2770 indicate that the Administrator is to establish specific effluent limitations for subcategories of point sources. Thus the House Report stated:

> As required in section 304(b)(1)(A), *the administrator, by regulations, is to identify the degree of effluent reduction attainable by the application of the best practicable control technology currently available for classes and categories of point sources.* By this the Committee expects that the Administrator will concentrate on, but not be limited to, those categories of point sources enumerated in section 306(b)(1)(A) and any which the Administrator might add to that list. *The Committee expects that the identification will be in objective terms and will set out actual performance levels for the classes and categories of point sources rather than prescribing specific control techniques, processes or equipment."* H. Rep.. No. 92-911, 92d Cong., 2d Sess., 107 (1972), reprinted in Senate Committee on Public Works, Committee Print, A

Legislative History of the Water Pollution Control Act Amendments of 1972, 93d Cong. 1st Sess., at 794 (1973) (hereinafter "Legislative History"). (emphasis added).

The Senate Report similarly indicates that effluent limitations will be established by regulations, and in addition indicates that the defendants' approach in incorporating factors into such limitations is consistent with the statutory scheme.

> "It is the Committee's intention that pursuant to subsection 301(b)(1)(A), and Section 304(b) the Administrator will interpret the term 'best practicable' when applied to various categories of industries as a basis for specifying *clear and precise effluent limitations* to be implemented by January 1, 1976. *In defining best practicable for any given industrial category, the Committee expects the Administrator to take a number of factors into account.* These factors should include the age of the plants, their size and unit processes involved and the cost of applying such controls. In effect, for any industrial category, the Committee expects the Administrator to define a range of discharge levels, above a certain base level applicable to all plants within that category. In applying effluent limitations to any individual plant, the factors cited above should be applied to the specific plant. In no case, however, should any plant, be allowed to discharge more pollutants per unit of production than is defined by that base level." S.Rep. No. 92-414, 92 Cong., 1st Sess. p. 50, U.S. Code Cong. & Admin. News 1972, p. 3716; Legislative History at 1468. (emphasis added).

Plaintiffs argue that the reference to the Administrator establishing a "range of discharge levels" supports their construction of the Act. However, by creating narrow subcategories of point sources subject to different limitations, the Administrator has in effect created a range of discharge levels for various categories of point sources—in this case the category being inorganic chemicals manufacturing. In any case, the determination herein challenged set the limitation of "no discharge of process waste water" for two types of sulfuric acid plants, indicating that in the Adminis-

trator's opinion a range of numbers was inappropriate. Whether the substance of this decision was correct is, as noted above, to be challenged under section 509(b)(1)(E) in the Court of Appeals.

In the Conference Report on S. 2770 the following was stated with respect to section 304(b):

> "In determining the 'best available technology' for a particular category or class of point sources, the Administrator is directed to consider the cost of achieving effluent reduction. *The Conferees intend that the factors described in section 304(b) be considered only within classes or categories of point sources and that such factors not be considered at the time of application of an effluent limitation to an individual point source within such a category or class.*
>
> "Except as provided for in section 301(c) of the Act, the intent is that effluent limitations applicable to individual point sources within a given category or class be as uniform as possible. The Administrator is expected to be precise in his guidelines so as to assure that similar point sources with similar characteristics, regardless of their location or the nature of the water into which the discharge is made, will meet similar effluent limitations.
>
> "The Conferees have provided, however, a mechanism for individual point source-by-source consideration in section 301(c). That section provides that the Administrator may modify any effluent limitation based on 'best available technology' to be achieved by July 1, 1983, with respect to any point source, upon a showing by the owner or operator of such point source that an effluent limitation so modified will represent the maximum use of technology within the economic capability of the operator and will result in reasonable further progress toward the goal of the elimination of the discharge of pollutants." 118 Cong.Rec. S. 16874 (daily ed., Oct. 4, 1972; Legislative History at 172. (emphasis added).

This quotation appears to be basically consistent with defendants' interpretation of the Act. Specifically it supports the defendants' construction that section 304(b) factors

may be utilized to create subcategories subject to uniform, specific effluent limitations and refutes plaintiffs' contention that such factors are to have an independent status for the purpose of establishing discharge levels for individual plants.

4.

Plaintiffs have raised a final contention concerning the promulgation of the regulations in question which is a concomitant to their other allegations based on their construction of the statute. They argue that in issuing the regulations for inorganic chemicals, the Administrator failed to adhere to the notice and opportunity-to-comment requirements of the Administrative Procedure Act, 5 U.S.C. § 553. There is apparently no dispute that notice of proposed rulemaking was published in the Federal Register on August 6, 1973 (38 Fed.Reg. 21202) and October 11, 1973 (38 Fed.Reg. 28174) and extensive comments were received from the public, including the plaintiffs. The final regulations issued on March 12, 1974 summarized the major comments received since the October 11 notice of proposed rulemaking.

The plaintiffs now contend however that they approached the proposed regulations on the assumption that such regulations would be flexible "guidelines" issued under section 304(b) and not actual effluent limitations to be mechanically applied to all plants in a given subcategory. Thus they argue that by promulgating actual effluent limitations, the Administrator rendered ineffective the notice and public participation requirements of the APA.

Although the record before the court tends to belie plaintiffs' allegations of surprise and prejudice, the court does not now decide this claim. Rather, the court is of the opinion that in view of its construction of the Act, supra, review of this procedural claim should also proceed in the Court of Appeals. Section 509(b)(1)(E) provides for jurisdiction in the Court of Appeals to review "the Administrator's action" in "promulgating any effluent limitation or

other limitation under section 301." This jurisdictional section is unqualified, and the court perceives no reason why review of the adequacy of notice and public participation regarding regulations which establish effluent limitations, should not proceed in the same manner as a suit challenging the substantive action of the Administrator in setting particular limitations.

To summarize, the court concludes that the regulations herein challenged are effluent limitations established by the Administrator pursuant to section 301(b) and 304(b); and that review of both the substance of such limitations and the procedures utilized in establishing the same is exclusively in the Court of Appeals pursuant to section 509 (b)(1)(E). Accordingly, for the reasons stated defendants' motion to dismiss this suit for lack of subject matter jurisdiction is hereby granted.

United States Court of Appeals
FOR THE FOURTH CIRCUIT

No. 74-2237

E. I. DU PONT DE NEMOURS AND COMPANY, OLIN CORPORATION, FMC CORPORATION, AMERICAN CYANAMID COMPANY, MONSANTO COMPANY, THE DOW CHEMICAL COMPANY, ALLIED CHEMICAL CORPORATION AND HERCULES, INC.

Appellants

v.

RUSSELL E. TRAIN, as Administrator, Environmental Protection Agency, and JOHN R. QUARLES, as Deputy Administrator, Environmental Protection Agency

Appellees

On appeal from the United States District Court for the Western District of Virginia, at Roanoke, James C. Turk, Chief District Judge.

Argued April 22, 1975 Decided Dec. 30, 1975

Before RIVES* and BREITENSTEIN**, Senior Circuit Judges, and WIDENER, Circuit Judge.

Robert C. Barnard (Douglas E. Kliever and Charles F. Lettow, Cleary, Gottlieb, Steen and Hamilton, John L. Walker Jr., on brief) for Appellants; Kathryn A. Oberly, Attorney U.S. Department of Justice, Paul R. Thomson, Jr., Assistant United States Attorney, (Wallace H. Johnson, Assistant Attorney General, Alan G. Kirk, II, Assistant Administrator for Enforcement and General Counsel, Edmund B. Clark, Bruce J. Chasan, Attorneys, U.S. Department of Justice, Ray E. McDevitt, Attorney, Environmental Protection Agency, on brief) for Appellees.

* Senior Circuit Judge, U.S. Court of Appeals for the Fifth Circuit.

** Senior Circuit Judge, U.S. Court of Appeals for the Tenth Circuit.

WIDENER, Circuit Judge:

This is an appeal from a judgment of the United States District Court for the Western District of Virginia dismissing appellants' action for lack of subject matter jurisdiction. Suit was filed in the district court by the appellants, eight chemical manufacturers, who sought review of certain regulations promulgated under the Federal Water Pollution Prevention and Control Act of 1972. 33 USC § 1251 et seq (hereinafter the Act). These regulations, which purport to establish effluent limitations for inorganic chemicals, were issued by the Administrator of the Environmental Protection Agency (EPA), appellee herein, on March 12, 1974, and consist of:

(1) Standards of performance for new plants.

(2) Pretreatment standards for new plants discharging wastes into municipal treatment plants.

(3) Effluent limitations for existing plants. 39 Fed. Reg. 9612 et seq, 40 CFR 415.

The only question presented in this appeal is whether the district courts have jurisdiction to review effluent limitations regulations issued by the Administrator to control effluent discharges from existing plants. A necessary corollary is whether the courts of appeals have jurisdiction under § 509 of the Act, 33 USC § 1369(b)(1), to review, on direct petition for review, regulations for existing plants, for if we have the jurisdiction, the district courts do not.[1] We conclude for the reasons stated below that the

[1] Section 509 provides in relevant part:

"(b)(1) Review of the Administrator's action . . . (E) in approving or promulgating any effluent limitation or other limitation under section 301, 302, or 306, and (F) in issuing or denying any permit under section 402 may be had by any interested person in the Circuit Court of Appeals of the United States for the Federal judicial district in which such person resides or transacts such business upon application by such person."

No question is made here of any concurrent jurisdiction of the district courts and the courts of appeals, and we see nothing in the statute to indicate that Congress intended such concurrent jurisdiction. As noted in *Passenger Corp. v. Passenger Association*, 414 US 453, 458 (1974), "[a] frequently stated principle of statutory con-

courts of appeals do have jurisdiction to review directly the regulations in question, and, therefore, the judgment of the district court must be affirmed.

As the district court noted, the issue presented was largely one of first impression. Although the matter has now been considered directly or indirectly by some few courts, it is yet relatively new and we think it appropriate that we ascertain the intent of Congress in adopting the Act in its present form by looking to the language of the statute itself and its legislative history, as well as the decisions on the subject. The original Act dates from 1948, but did not assume its present form until 1972 when the then existing statutory language was extensively revised. The object of these revisions, as noted in the body of the statute itself, was and is the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters. 33 USC § 1261. This goal is to be accomplished primarily through the control of pollutants discharged into navigable waters. It should be kept in mind that the 1972 amendments changed the emphasis in the statutory scheme of water pollution control from that of regulating the quality standard of the body of water involved to regulating not only the quality standard of the body of water but also the quality of effluent discharged into the body of water. Compare the various statutes itemized in footnotes to 33 USCA § 1251, et seq; and see, e.g., Senate Report 92-214, dated October 28, 1971; House Report 92-911 dated March 11, 1972; *CPC International v. Train*, 515 F.2d 1032, 1034-36 (8th Cir. 1975).

In the course of adopting the 1972 amendments, a great deal of attention was focused on the proper function of the States in the regulation and control of overall water quality. This is reflected in Congress' concern, written

struction is that when legislation expressly provides a particular remedy or remedies, courts should not expand the coverage of the statute to subsume other remedies." Cf. § 505(a) of the Act, 33 USC § 1365(a), which specifically confers jurisdiction on the district courts for certain actions under the statute. *NRDC v. Train*, 7 ERC 1123 (D.C. Cir. 1974).

into the statute, that the "primary responsibilities and rights of the States to prevent, reduce and eliminate pollution be preserved." 33 USC § 1251(b). Although the United States in the last analysis regulates, in most cases, the amount of pollution discharged into the nation's waters, the States, through the permit granting plan (§ 402, 33 USC § 1342), are intended to take a large part in the administration and application of the statutory plan, including the application of regulations issued by the EPA as well as the application of the statute.[2] There is here no need to, and we do not, express an opinion as to the extent, construction, effect, or application of any regulation issued by EPA.

Central to the statutory framework within which the permit system is to operate are the regulations providing for or establishing effluent limitations. The EPA contends that the Act contemplates that the Administrator promulgate actual effluent limitations which will be uniformly applied in issuing permits under the Act.[3] According to its

[2] For a good general discussion of the statute through the eyes of EPA's Assistant General Counsel, see Zener, *The Federal Law of Water Pollution Control*, Federal Environmental Law, 683 (West 1974).

[3] Section 402, 33 USC § 1342, establishes the procedure for the issuance of permits under the Act. It states:

"(a)(1) Except as provided in sections 318 and 404 of this Act, the Administrator may, after opportunity for public hearing, issue a permit for the discharge of any pollutant, or combination of pollutants, notwithstanding section 301(a), upon condition that such discharge will meet either all applicable requirements under section 301, 302, 306, 307, and 403 of the Act, or prior to the taking of necessary implementing actions relating to all such requirements, such conditions as the Administrator determines necessary to carry out the provisions of this Act.

"(2) The Administrator shall prescribe conditions for such permits to assure compliance with the requirements of paragraph (1) of this subsection, including conditions on data and information collection, reporting, and such other requirements as he deems appropriate.

. . . .

"(b) At any time after the promulgation of the guidelines required by subsection (h)(2) of section 304 of this Act, the Governor of each State desiring to administer its own permit program for dis-

construction, Congress intended that the Administrator issue effluent limitations through regulations promulgated under § 301(b), 33 USC § 1311(b). That section provides: The Administrator asserts that he has combined his rule-making authority under this section with that specifically provided for under § 304(b), 33 USC § 1314(b), to arrive at the comprehensive set of regulations which are here

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charges into navigable waters within its jurisdiction may submit to the Administrator a full and complete description of the program it proposes to establish and administer under State law or under an interstate compact. In addition, such State shall submit a statement from the attorney general (or the attorney for those State water pollution control agencies which have independent legal counsel), that the laws of such State, or the interstate compact, as the case may be, provide adequate authority to carry out the described program. The Administrator shall approve each such program unless he determines that adequate authority does not exist. . . .

. . . .

"(d)(1) Each State shall transmit to the Administrator a copy of each permit application received by such State and provide notice to the Administrator of every action related to the consideration of such permit application, including each permit proposed to be issued by such State.

"(2) No permit shall issue (A) if the Administrator within ninety days of the date of his notification under subsection (b)(5) of this section objects in writing to the issuance of such permit, or (B) if the Administrator within ninety days of the date of transmittal of the proposed permit by the State objects in writing to the issuance of such permit as being outside the guidelines and requirements of this Act."

"(b) In order to carry out the objective of this Act there shall be achieved—

(1)(A) not later than July 1, 1977, effluent limitations for point sources, other than publicly owned treatment works, (i) which shall require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 304(b) of this Act. . . .

. . . .

(2)(A) not later than July 1, 1983, effluent limitations for categories and classes of point sources other than publicly owned treatment works, which (i) shall require application of the best available technology economically achievable . . . as determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act."

under review. Since § 509 of the Act states that actions of the Administrator under § 301 are directly reviewable by courts of appeals, the EPA asserts that the district court was correct in dismissing the complaint for lack of jurisdiction.

Appellants, on the other hand, while not challenging the right of this court to directly review any action of the Administrator under § 301, contend that he lacks authority to issue effluent limitation regulations under the provisions of that section. They argue that the language of § 301 requires only that effluent limitations be "achieved," not that they be independently established and achieved. Thus, according to their interpretation of the Act, § 301 merely sets forth the statutory objectives to be attained, and the means of actually reaching these objectives are set out in § 304 of the Act, 33 USC § 1314, which states in part:

> "(a)(1) The Administrator . . . shall develop and publish . . . criteria for water quality. . . .
>
> "(b) For the purpose of adopting or revising effluent limitations under this Act the Administrator shall . . publish . . . regulations providing guidelines for effluent limitations. . . . Such regulations shall—
>
> "(B) specify factors to be taken into account in determining the best measures and practices available to comply with subsection (b)(2) of section 301 of this Act. . . ."

The challenged regulations must, therefore, according to appellants, be deemed to have been issued under § 304(b) and neither under § 301 nor a combination of § 301 and § 304(b) as the EPA asserts. Based upon this interpretation of the statutory provisions in issue, appellants contend that review in the courts of appeals pursuant to § 509(b)(1) is not available and that the action was properly brought before the court below in accordance with the provisions of the Administrative Procedure Act, 5 USC § 701 et seq. As a corollary to this construction, appellants seek a ruling that the effluent limitations for existing point sources issued by EPA are invalid because

they say the Administrator had no authority to issue them under § 301, and could only have issued them under § 304(b).

The case of *CPC International, Inc. v. Train*, 515 F.2d 1032 (8th Cir. 1975), appears to agree with appellants' interpretation of the statutory provisions involved. In that case, the court stressed the fact that § 301 provides the Administrator with no separate power to promulgate effluent limitations for existing point sources. The court noted,

> "[o]ther sections of the Act demonstrate that the omission of such a provision [providing for the issuance of regulations under § 301] was not an oversight, for Congress provided unambiguously for the promulgation of national standards in other sections of the Act. Nationally promulgated standards were expressly mandated for § 306(b)(1)(B). . . ." 515 F.2d at 1038.

Thus, the court concluded that jurisdiction to review such actions of the EPA, which were deemed to have been taken in accordance with § 304(b), did not lie in the courts of appeals because the EPA could not promulgate effluent limitations for existing sources by regulations under § 301.

The court below, on the other hand, ruled that the effluent limitations standards at issue were promulgated pursuant to § 301 "apart from § 402 permit proceedings," and, as a result, it lacked jurisdiction to review. The court pointed first to § 509(b)(1)(E), which refers to judicial review of the Administrator's actions "in approving or promulgating any effluent limitation[s] or other limitation[s] under sections 301, 302, or 306" as supportive of the proposition that effluent limitations could be issued under § 301. In addition, the court noted that § 402(a) requires that permits issued thereunder meet the applicable requirements under § 301, and we note that under § 509(b) review of the action of EPA in issuing a permit is in the courts of appeals. The district court also noted it was of opinion the Administrator had authority under § 301(b)

to promulgate the regulations pursuant to his authority under § 304(b) and concluded that challenges to the effluent limitations must be handled in the courts of appeals.

This or related questions have also been considered by several other courts faced with challenges to EPA regulations under this statute. The Third Circuit, in *American Iron and Steel Institute v. EPA*, 8 ERC 1321 (3d Cir. 1975), disagreed with the reasoning of the Eighth Circuit in *CPC* and concluded that the Administrator was authorized to issue single number effluent limitations under § 301. The jurisdictional question was apparently not raised there. That court considered such effluent limitations as a uniform ceiling, the maximum amount of pollutant in effluent discharge which is permissible. And it also gave effect to § 304 by requiring compliance with it by EPA in preparing meaningful guidelines and addressing statutory factors for application to industry. Since it found § 304 was not complied with by EPA, the court set aside the issued effluent limitations because the limitations might have been less stringent if the statute (§ 304) had been followed in issuing the guidelines and consideration of statutory and individual factors.

In *American Meat Institute v. Environmental Protection* [*sic*, Agency], No. 74-1394 (7th Cir. 1975), the jurisdictional problem was also considered. The court held it had jurisdiction for it considered the effluent limitations were issued under § 301 of the Act. The court stated "the most rational reading of the language of the Act is that § 301 is a source of authority to promulgate effluent limitations, independent of the § 402 permit procedure." This part of the holding is then quite similar to that of the district court in our case. The Seventh Circuit also depended on *Train v. National Resources Defense Council*, 421 US 60 (1975); gave weight to the EPA's construction of the statute; and found it was "sufficiently reasonable to preclude . . . [the court] from substituting its judgment for that of the agency." We express no opinion as to the validity of this latter propo-

sition in the context of a court determining its own jurisdiction which, of course, is conferred by Congress, *Lockerty v. Phillips*, 319 US 182, 187 (1943), and we need not in order to arrive at our conclusion.

In *American Petroleum Institute v. Train*, 7 ERC 1795 (D. Colo. 1974), the court concluded it lacked jurisdiction since the challenged regulations were issued under § 301 as well as § 304, and review should be had in the courts of appeals "even should the Administrator have interpreted his authority under [§ 301] incorrectly." Finally, the court, in *American Paper Institute v. Train*, 381 F. Supp. 553 (D.D.C. 1974), likewise found it lacked jurisdiction to review the challenged regulations even if they were guidelines under § 304 for in that event they would be "only an aid in establishing effluent limitations and since limitations, not guidelines, comprise the standards of performance for the issuance of permits, plaintiff [could not] be heard to complain that it [was] '*adversely affected or aggrieved*' by guidelines, the criteria of section 10(a) of the APA."

Thus, the parties to this dispute point to authority in support of their respective positions. We are of opinion, however, that the central question addressed by both the Eighth Circuit and the district court below, as well as some of the other cases, regarding the EPA's authority under § 301 should not necessarily be dispositive of the jurisdictional issue. Both courts have decided the substantive question of authority to issue the regulations under § 301 in order to reach the question of jurisdiction. With all deference to both courts, we think it unnecessary to decide the substantive question of authority to issue the regulations under § 301 alone in order to decide the question of which federal court has jurisdiction to review them.

We are impressed, as was the court below, by the express language of § 509(b)(1)(E) which refers to "review of the Administrator's action . . . in approving or promulgating any effluent limitation or other limitation under

section 301, 302, or 306." It is significant to note that section 306 provides for the issuance of regulations "establishing Federal standards of performance for *new* sources [of pollutants]." 33 USC § 1316 (emphasis added). Section 301, by way of contrast, is concerned with existing sources.[4] Were we to accept appellants' interpretation of the Act, review of regulations governing existing sources would lie in the district courts under the Administrative Procedure Act, while review of new source standards would be before the courts of appeals under § 509.[5] We do not conclude that Congress intended for review to be bifurcated in this manner.

While there is little legislative history relating to § 509, it is highly significant that the committee reports make no mention of any division of judicial review. It is clear that the House and Senate conferees disagreed over whether there should be judicial review in the district courts or the courts of appeals. Yet, there is no indication of any

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[4] The terms "source" and "new source" are defined in the Act as follows:

> "(2) The term 'new source' means any source, the construction of which is commenced after the publication of proposed regulations prescribing a standard of performance under this section which will be applicable to such source, if such standard is thereafter promulgated in accordance with this section.
>
> "(3) The term 'source' means any building, structure, facility, or installation from which there is or may be the discharge of pollutants." 33 USC § 1316(a)(Supp. 1975).

[5] The practical difficulties occasioned by such a review procedure are illustrated by means of an example. Assume that an existing plant licensed under the Act expands. It is possible that the expanded portion of the plant would constitute a new point source within the meaning of § 306. In that event, the plant could be compelled to maintain two actions simultaneously, one in the district court and another in the court of appeals, in order to challenge the action of the Administrator. The jurisdictional overlap would only add to the complexities already inherent in the statute.

Recognizing the classical prohibition on residents of glass houses who throw rocks, with the Third Circuit we are yet constrained to say the Act is not clear. A simple declaratory sentence, or even a phrase, or a word, could have solved this knotty question, which relates to a substantial part of the industry in the country.

compromise agreement providing for divided review of the EPA standards. To the contrary, the Senate appears to have prevailed on this point. Leg. History (Conference Report), p. 330. A literal reading of the Conference Report without reference to the statute supports the position we take here.

In the House Report discussing judicial review, it was noted that "with the number and complexity of administrative determinations that the legislation requires there is a need to establish a clear and orderly process for judicial review." Although the House Bill originally provided for review in the district courts, this report indicates that Congress did not intend for the actions of the Administrator to be subjected to the complexities inherent in a system of review divided between different courts. Rather, it appears to have been its desire that administrative actions be reviewable, but in a manner not likely to impede enforcement unduly. Leg. History (House Report), p. 823.

The EPA contends that, this being the intent of Congress, § 301 must be viewed as authorizing the promulgation of effluent limitation regulations. Otherwise, they argue, § 509's reference to § 301 would be meaningless. We are not persuaded that this conclusion must necessarily follow in order for this court to find jurisdiction under § 509.

Even if § 301 merely sets out the technological objectives to be attained under the Act, courts of appeals may properly assume jurisdiction to review actions of the Administrator in issuing regulations to achieve these objectives. If § 301 is to be viewed in the manner advocated by the appellants, then § 304(b) must necessarily be deemed the key to the attainment of the objectives set forth in § 301. Thus, to obey the mandate of § 301, "guidelines for effluent limitations" must be promulgated under § 304(b). Construed in this light, any action taken by the Administrator under § 304(b) should properly be considered to be pursuant to the provisions of § 301 and, therefore, reviewable by this court under § 509.

By enacting § 509(b), Congress established a statutory plan to be followed to obtain judicial review of agency actions under the Act. Only those courts upon which Congress has bestowed authority have jurisdiction. See *Whitney Bank v. New Orleans Bank,* 379 US 411, 420, 422.

The district court correctly held it had no jurisdiction. None is conferred upon it by the statute involved. In federal courts, "[j]urisdiction is essentially the power conferred by Congress to decide a given type of case one way or the other." *Hagans v. Lavine,* 415 US 528, 538. In its exercise of its statutory jurisdiction, this court determines whether the Administrator acted within his statutory authority.

Since we are of opinion that Congress has conferred on the courts of appeals the power to decide the merits of this case one way or the other, and not conferred such power on the district courts, we think the judgment of the district court should be affirmed.

Accordingly, the district court was without jurisdiction, and its judgment, if not its entire opinion, is

AFFIRMED.

JUDGMENT

United States Court of Appeals

FOR THE FOURTH CIRCUIT

No. 74-2237

E. I. DU PONT DE NEMOURS AND COMPANY, OLIN CORPORATION, FMC CORPORATION, AMERICAN CYANAMID COMPANY, MONSANTO COMPANY, THE DOW CHEMICAL COMPANY, ALLIED CHEMICAL CORPORATION AND HERCULES, INC.

Appellants

v.

RUSSELL T. TRAIN, as Administrator, Environmental Protection Agency, and JOHN R. QUARLES, as Deputy Administrator, Environmental Protection Agency

Appellees

Appeal from the United States District Court for the Western District of Virginia.

THIS CAUSE *came on to be heard on the record from the United States District Court for the Western District of Virginia, and was argued by counsel.*

ON CONSIDERATION WHEREOF, *It is now here ordered and adjudged by this Court that the judgment of the said District Court appealed from, in this cause, be, and the same is hereby affirmed.*

WILLIAM K. SLATE, II
Clerk

United States Court of Appeals

FOR THE FOURTH CIRCUIT

Nos. 74-1261, 74-1290,
74-1296-1304, 74-1357,
74-1406-7, 74-1588-90,
74-1670-1 and 74-1741

E. I. DUPONT DE NEMOURS & COMPANY

Petitioner,

v.

RUSSELL E. TRAIN, as Administrator of the Environmental Protection Agency,

Respondent,

On petitions for review of actions of the Administrator of the Environmental Protection Agency.*

Argued April 22, 1975 Decided March 10, 1976

*The following Petitions for Review, all naming Train as Respondent, were consolidated.

74-1261 and 74-1357—DuPont & Co.
74-1290 and 74-1299—Allied Chemical Corp.
74-1296 and 74-1303—FMC Corp.
74-1297 and 74-1304—American Cyanamid Co.
74-1298 and 74-1301—Dow Chemical Co.
74-1300 and 74-1302—Olin Corp.
74-1406 and 74-1407—Stauffer Chemical Co.
74-1588—Diamond Shamrock Corp.
74-1589—PPG Industries, Inc.
74-1590—BASF Wyandotte Corp.
74-1670 and 74-1671—Cities Service Co.
74-1741—NL Industries, Inc.

Before RIVES** and BREITENSTEIN***, Senior Circuit Judges, and WIDENER, Circuit Judge.

Robert C. Barnard, Douglas E. Kliever and Charles F. Lettow for the Petitioners.

Kathryn A. Oberly for Respondent. With her on the briefs were Wallace H. Johnson, Assistant Attorney General, Edmund B. Clark, Attorney, Department of Justice, Alan G. Kirk, II, Assistant Administrator for Enforcement and General Counsel, and Ray E. McDevitt, Attorney, Environmental Protection Agency.

Briefs of Amici Curiae were filed by Angus Macbeth and Edward L. Strohbehn, Jr., for Natural Resources Defense Council, Frederick M. Rowe, Edward W. Warren, and Robert F. VanVoorhees for American Petroleum Institute, et al., Russell E. Leasure and Elliot S. Azoff for RMI Company, George C. Freeman, Jr., Turner T. Smith, Jr., and William A. Anderson, II, for Allegheny Power System, Inc., et al., Milton A. Smith, Lawrence B. Kraus, James F. Rill, Max N. Edwards, Richard E. Schwartz, and Collier, Shannon, Rill & Edwards for the Chamber of Commerce of the United States, Robert H. Young, Kenneth R. Myers and Archibald A. Campbell for New Jersey Zinc Company.

BREITENSTEIN, Senior Circuit Judge.

Companies engaged in the production of inorganic chemicals have filed 20 petitions for review of various regulations promulgated by respondent Train as Administrator of the Environmental Protection Agency. The petitions have been consolidated for presentation and disposition. The regulations were promulgated under the Federal Water Pollution Control Act Amendments of 1972. 33 U.S.C. §§ 1251-1376. Herein for brevity and clarity the Administrator at times will be referred to as EPA and the statutory references will be those found in the Act as set out in

**Of the Fifth Circuit, sitting by designation.

***Of the Tenth Circuit, sitting by designation.

86 Stat. 816 et seq.[1] Petitioners will be referred to collectively as Industry.

Industry's attack on the jurisdiction of the court of appeals has been rejected by our opinion in No. 74-2237, *DuPont & Company v. Train.*

The objective of the Act "is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." § 101(a). The goal is the elimination by 1985 of "the discharge of pollutants into the navigable waters." § 101(a)(1). Earlier legislation, which placed on the states the primary responsibility to maintain water quality, had proven inadequate. S. Rep. No. 92-414, 92 Cong. 2d Sess., 2 U.S. Cong. & Adm. News '72 3674. The Act made "a major change in the enforcement mechanism of the Federal water pollution control program from water quality standards to effluent limits." Ibid. at 3675.

Section 301(a) provides that except in compliance with specified sections of the Act "the discharge of any pollutant by any person shall be unlawful." Section 301(b) says that "to carry out the objective of this Act there shall be achieved" stated effluent limitations. Not later than July 1, 1977, those limitations for point sources, except publicly owned treatment works with which we are not concerned, "shall require the application of the best practicable control technology." § 301(b)(1)(A). For July 1, 1983, the requirement is "the best available technology economically achievable." § 301(b)(2)(A).

The foregoing requirements apply to existing sources. For new sources, § 306(a)(1) requires a standard of per-

[1] The parallel U.S. Code citations for the most frequently mentioned sections are:

Section 101—33 U.S.C. § 1251,
Section 301—33 U.S.C. § 1311,
Section 304—33 U.S.C. § 1314,
Section 306—33 U.S.C. § 1316,
Section 402—33 U.S.C. § 1342,
Section 501—33 U.S.C. § 1361,
Section 502—33 U.S.C. § 1362,
Section 509—33 U.S.C. § 1369.

formance "which reflects the greatest degree of effluent reduction which the Administrator determines to be achievable through application of the best available demonstrated control technology." Section 306(b)(1)(A) directs the Administrator within 90 days after enactment to publish a list of categories which at the minimum shall include 27 named industries among which is "inorganic chemicals manufacturing." Within one year after publication of the list of categories, the Administrator shall publish Federal standards of performance for new sources within each category. § 306(b)(1)(B).

Primary enforcement of the Act is secured through the permit system established by § 402. Permits for pollutant discharge may be issued by the Administrator, § 402(a)(1), or by a state which has adopted a permit program approved by the Administrator. § 402(b). The Administrator has veto power over a state issued permit. § 402(d)(2). All permits shall comply with the applicable provisions of §§ 301, 306, and other specified sections not including § 304. See § 402(a)(1) and (b)(1)(A).

Section 304 is the cause of much of the controversy. Within one year after enactment, the Administrator must publish "criteria for water quality accurately reflecting the latest scientific knowledge" on enumerated subjects. § 304(a)(1). Within the same period the Administrator shall publish regulations "providing guidelines for effluent limitations." § 304(b). Subsection (b)(1)(A) applies to the 1977 step and subsection (b)(2)(A) to the 1983 step. Each subsection mandates consideration of specified factors.

The Administrator did not act within the one year requirements of § 304. Compliance was not within the realm of reality. There are some 28,000 industrial dischargers and 27,000 others. About 30,000 applications for permits were filed. EPA characterizes the Act as "incredibly complex and demanding." A private suit was brought to compel compliance. The result was a court imposed timetable. *Natural Resources Defense Council, Inc. v. Train*, D.C. Cir., 510 F.2d 692, 710-714.

On March 12, 1974, EPA promulgated "effluent limitations guidelines for existing sources and standards of performance * * * for new sources in the inorganic chemicals manufacturing category of point sources." 39 Fed. Reg. 9612 et seq. These are the regulations under attack. In so doing EPA stated that it acted "pursuant to sections 301, 304(b) and (c), 306(b) and (c) and 307(c)." We are not concerned with § 307 which covers certain toxic pollutants. The regulations prescribe "effluent limitations guidelines for existing sources" and "standards of performance for new sources." 40 C.F.R. 401.10.

Industry attacks the regulations generally and specifically. We shall first consider the objections going to all of the regulations and then discuss those applying to particular sources.

I

GENERAL VALIDITY OF REGULATIONS

(a) Notice.

Industry argues that the regulations are invalid because of EPA's failure to give the notice required by the Administrative Procedure Act, 5 U.S.C. § 553(b). In its October 11, 1973, notice of proposed rule-making, 38 Fed. Reg. 28174 et seq., EPA stated that its proposed action was taken pursuant to §§ 301, 304(b) and (c), 306(b), and § 307(c). Public comments received thereafter are contained in pp. 4884-5346 of the Appendix. In its March 12, 1974, promulgation of the regulations, EPA summarized the comments. See 39 Fed. Reg. 9612-9615.

The rule-making and notice provisions of APA "were designed to assure fairness and mature consideration of rules of general application." *National Labor Relations Board v. Wyman-Gordon Co.*, 394 U.S. 759, 764. Notice is sufficient if it provides a description of the subjects and issues involved. 5 U.S.C. § 553(b)(3) and *California Citizens Band Association v. United States*, 9 Cir., 375 F.2d

43, 49, cert. denied 389 U.S. 844. Industry had adequate notice and took advantage of it.

(b) EPA's power to establish effluent limitations by regulations.

This issue goes to the heart of the controversy. Industry says that the Administrator promulgates guidelines to be considered by the permit issuer. EPA says that the Administrator establishes effluent limitations by regulations which, with exceptions to be noted later, have uniform application throughout the nation and which must be applied by the permit issuer.

(1) Applicable Law.

The Administrative Procedure Act, 5 U.S.C. § 706 (2)(A), authorizes a reviewing court to set aside agency action which is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." As said in *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 416, "the court must consider whether the decision was based on a consideration of the relevant factors and whether there has been a clear error of judgment." See also *Appalachian Power Company v. Environmental Protection Agency*, 4 Cir., 477 F.2d 495, 506-507. The court may not substitute its judgment for that of the agency. Overton Park, 401 U.S. at 416. If the agency's construction of the controlling statute is "sufficiently reasonable" it should be accepted by the reviewing court. *Train v. Natural Resources Defense Council, Inc.*, 421 U.S. 60, 75.

The grounds upon which the agency acted must be clearly disclosed in, and sustained by, the record. *Federal Trade Commission v. Sperry and Hutchinson Co.*, 405 U.S. 233, 249. The agency must "explicate fully its course of inquiry, its analysis and its reasoning." *Ely v. Velde*, 4 Cir., 451 F.2d 1130, 1139; see also *Appalachian Power Company v. Environmental Protection Agency*, 4 Cir., 477 F.2d 495, 507. After the fact rationalization by counsel in brief and argument does not cure non-compliance by the

agency with the stated principles. *Dry Color Manufacturers' Association, Inc. v. Department of Labor*, 3 Cir., 486 F.2d 98, 104, and particularly cases cited in n. 8.

The function of judicial review of agency action is to determine (1) authority of the agency, (2) compliance by the agency with the necessary procedural requirements, and (3) any claim that agency action is arbitrary, capricious, or an abuse of discretion. Citizens to Preserve Overton Park, Inc., 401 U.S. at 415-417. With these principles in mind, we turn to the regulations.

(2) Agency Authority.

The Eighth Circuit has held, *CPC International Inc. v. Train*, 8 Cir., 515 F.2d 1032, that the Administrator may not promulgate regulations establishing effluent limitations for existing sources. The Third and Seventh Circuits have held to the contrary. See *American Iron and Steel Institute v. Environmental Protection Agency*, 3 Cir., slip opinion filed November 7, 1975, p. 8; and *American Meat Institute v. Environmental Protection Agency*, 7 Cir., slip opinion filed November 24, 1975, p. 16. On the mentioned point we disagree with the Eighth Circuit and agree with the Third and Seventh Circuits. Our views on the effect of the regulations will be stated later. The conflict among the circuits emphasizes the confusion caused by this poorly drafted and astonishingly imprecise statute.

The regulations impose "effluent limitations guidelines." The quoted term appears nowhere in the Act. Section 301 refers to "effluent limitations"; § 304 to "guidelines"; and § 306 to "standards of performance." It may be that Congress intended § 304 guidelines to precede § 301 limitations. That did not occur. Under compulsion of a judicially ordered timetable, EPA combined the two steps. The question is the validity of the action taken. Nothing in the Act forbids surmounting the two steps in one jump.

Each party spends much effort in sustaining its position by analysis of the Act and its legislative history. Without going into any details, it is enough to say that the Act is

vague, uncertain, and inconsistent. Support can be had for diametrically opposed conclusions. Except for some statements in committee reports, see e.g. our opinion in No. 2237—*DuPont v. Train*, the two-volume, 1766 page, Legislative History is of little help. In it, statements can be found to uphold almost any position which one cares to take.

We are faced with the problem of making workable a vague, regulatory statute so as to attain the congressional objective that the discharge of pollutants be eliminated. This end may not be reached by quibbling over semantics. Ambiguity must be transformed into practicality.

Section 304(b) specifically authorizes the Administrator to publish "regulations, providing guidelines for effluent limitations." Nothing is said in § 301 about regulations. The source of power to impose § 301 limitations by regulations can only come from § 501(a) which authorizes the Administrator "to prescribe such regulations as are necessary to carry out his functions under this Act."

The question then is what are his functions. Section 101(d) says that he "shall administer this Act." The control technology mentioned in § 301(b)(1)(A) and (b)(2)(A) is that defined and determined by the Administrator under § 304. Section 301(e) refers to "[e]ffluent limitations established pursuant to this section" but does not say who does the establishing. The Act is unworkable unless someone takes the initiative in deciding what limitations are generally applicable to discharges, whether by individual plants, categories, subcategories, classification, or otherwise. Because the control technology is determined by the Administrator, it is reasonable that he establish the limitations generally applicable to categories. Such action is within the performance of his functions.

From a practical standpoint we find no objection to the combining of limitations and guidelines. The Administrator was faced with unrealistic statutory requirements and a court imposed timetable. He had the duty to proceed. His action was "sufficiently reasonable" and should

be accepted by a reviewing court. *Train v. Natural Resources Defense Council, Inc.*, 421 U.S. 60, 75. We conclude that he had authority to promulgate regulations establishing limitations for existing sources.

(3) Effect of Exercise of Authority.

The authority to promulgate the regulations must not be confused with the effect of those regulations. Industry says that the effect will violate the Act and, hence, the regulations are invalid.

In part the controversy is whether the regulations are § 301 limitations or § 304 guidelines. The regulations impose "effluent limitations guidelines." EPA says in effect that the regulations impose limitations which are applicable uniformly throughout the nation and, with some exceptions, must be mechanically cranked into each permit by the issuer. Industry says that the regulations are guidelines for the information of and consideration by, but not binding on, the permit issuer. Inherent in this dispute is the question of national uniformity versus state power and responsibility.

Section 101(a) refers to the "integrity of the Nation's waters," "the national goal," and "the national policy." Section 101(b) says that the policy of Congress is "to recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution."

Subsections 402(a)(1) and (b)(1) say that the permits shall comply with §§ 301, 306, and other sections not including § 304. If national uniformity is controlling, state action in issuing permits is inhibited. If the regulations are informational, the states may exercise reasonable discretion in permit issuance.

The Act, § 502(11), defines "effluent limitation" to mean "any restriction established by a State or the Administrator." The pertinent regulation, 40 C.F.R. § 401.11(i), defines the same term to mean "any restriction established

by the Administrator." The conflict must be resolved in favor of the statute. Accordingly, an effluent limitation may be established either by a state or by the Administrator. However, we go around in a circle because § 402(d)(2) gives the Administrator veto power over state action. Section 401.11(i) is set aside and remanded for reconsideration.

For all sources, both existing and new, we believe that the solution which most nearly satisfies congressional intent is recognition that the regulations are presumptively applicable to permit applications. The regulations control unless that presumption is rebutted. Thus, national uniformity, subject to limited specific exceptions, is attained. The balance of general rule and narrow exceptions assures all possible uniformity without sacrifice of the flexibility needed to adjust for disparate plants in dissimilar circumstances.

Both the Act and the regulations recognize permissible variances. Section 301(c) empowers the Administrator to modify the requirements of § 301(b)(2)(A), 1983 phase, upon a showing that modified requirements "(1) will represent the maximum use of technology within the economic capability of the owner or operator; and (2) will result in reasonable further progress toward the elimination of the discharge of pollutants." Industry points out that this does not apply to the 1977 limitations. However, in each of the regulations applicable to the 1977 phase for those subcategories under consideration, there is recognition that adjustments may be appropriate for certain plants and provision for pertinent procedures. See e.g. 40 C.F.R. § 415.62 applying to chlorine. The differences between the provisions of the statute and those of the regulations are of no present concern. Both recognize and permit variances. In any event, the "best practicable control technology" for 1977 may not be construed more stringently than the "best available technology economically achievable" as ameliorated by the qualification of § 301(c) for 1983 limitations.

Provisions for variances, modifications, and exceptions are appropriate to the regulatory process. See *United States v. Allegheny-Ludlum Steel Corp.*, 406 U.S. 742, 755. They have been recognized in actions pertaining to environmental regulations. See e.g. *Portland Cement Association v. Ruckelshaus*, D.C. Cir., 486 F.2d 375, 399, cert. denied 417 U.S. 921, and *International Harvester Co. v. Ruckelshaus*, D.C. Cir., 478 F.2d 615, 641. The administration of these provisions in practice is a matter of speculation at the present. The question will arise when a claim for a variance is made in a permit application.

Neither the Act nor the regulations contain any variance provision for new sources. The rule of presumptive applicability applies to new sources as well as existing sources. On remand EPA should come forward with some limited escape mechanism for new sources.

In the discussion which follows we shall treat the regulations as presumptively applicable to both existing and new sources.

(c) Agency Compliance with Procedural Requirements.

The issues involved will be considered separately.

(1) Subcategories.

EPA imposed the limitations on the basis of subcategories. Industry desires that the limitations be fixed on the basis of individual plants.

The provision relating to the 1977 step, § 301(b)(1)(A), refers to "effluent limitations for point sources." For the 1983 step the provision, § 301(b)(2)(A), is "effluent limitations for categories and classes of point sources." The section applicable to new sources provides, § 306 (b)(1)(A), that the Administrator shall publish "a list of categories of sources" which shall include specified industries.

"Point source" is defined, § 502(14), as a "conveyance *** from which pollutants are or may be discharged."

Read literally the 1977 requirement is for determination on the basis of individual discharges. The 1983 and new source requirements are on the basis of categories. We do not know the reason for the difference. Whatever it may have been, July 1, 1977, approaches and a holding that EPA must now start over and make the 1977 determinations on the basis of many thousands of individual plants would be chimerical. Practical considerations may not be ignored. A remand of all of the regulations pertaining to the 1977 step would result in administrative delay, have the potential of judicial review, and further postpone attainment of the Act's objectives. In the circumstances we accede to the EPA procedure of promulgating general regulations which impose presumptively applicable effluent limitations for all three steps on the basis of categories.

With regard to the 1977 step, the reference in § 301(b)(2)(A) to "point sources" is taken to mean that Congress intended that the permit grantor should give individual attention to each "point source" and apply the factors specified in § 304(b)(1)(B). Some of those factors, e.g., "age of equipment and facilities involved," can only be applied on an individual basis. EPA recognized this problem when it included variance provisions in its regulations for the 1977 step. See e.g. 40 C.F.R. § 415.62 and the reference therein to factors which are "fundamentally different."

For the inorganic chemical manufacturing industry EPA established 22 subcategories based on the chemical product manufactured. In addition where dissimilar processes are used to manufacture the same product the limitations are refined to provide separate limitations within the subcategory.

The method of categorization adopted by EPA will reasonably effectuate the congressional objectives. Further subdivision might unduly complicate the administration of the Act. Rulemaking of necessity is general. Problems relating to specific factual situations are for determination at the permit-issuing stage.

(2) Use of single numbers.

The regulations impose limitations in terms of single numbers rather than in a range of numbers. Industry attacks this method saying in effect that EPA promulgated guidelines and that guidelines are not absolutes. Nothing in the Act prohibits the Administrator from using single numbers in establishing effluent limitations. The use of a single number limitation for discharge, permits any discharge from zero up to the allowed amount, subject always to the principle of presumptive validity which we have stated.

We are aware that the Third Circuit, *American Iron and Steel Institute v. Train*, supra, has held that the regulations there considered are invalid because "they failed to provide meaningful ranges or guidance in considering individual factors." Slip opinion at p. 37. On the facts presented to us, we cannot accept that conclusion. The EPA has promulgated zero discharge limitations with regard to many of the discharge sources which are before us. If a range is required, a zero discharge provision violates the Act. An objective of the Act is the elimination of all pollutant discharges by 1985. § 101(a)(1). The expertise of the Administrator is persuasive as to whether the limitations be fixed in single numbers or ranges. A claim of arbitrary action in this regard may be considered in court review under § 509(b)(1)(E) of the issuance or denial of a permit. Then specific facts may be presented and the problem will be actual rather than hypothetical. It may be that with some categories ranges are desirable and with others single numbers are appropriate. We are dealing with the general problem and decline to make advisory statements covering specific applicability. For the purposes of the suit before us relating to "inorganic chemicals manufacturing," we accept the Administrator's use of single numbers.

(3) Statutory Factors.

Section 304(b)(1)(B), 1977 step, and § 304(b)(2)(B), 1983 step, specify factors to be taken into account to

determine control measures. For existing sources, these are essentially the same except in one respect. The 1977 step includes "consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application." A balancing is required. For the 1983 step there is no reference to balancing and the listed factors include "cost of achieving such effluent reduction." For new sources the requirement is the effluent reduction "achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives." § 306(a)(1).

A basic problem is the effect to be given the factors specified in § 304(b)(1)(B) and (2)(B). Section 301, which provides for effluent limitations, says in its subsection (1)(A) that the 1977 step requires the technology "as defined by the Administrator pursuant to section 304(b) of the Act." For the 1983 step the language is "in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act." We know of no reason for the change in language. Be that as it may. The reference in § 301 to § 304 must mean that Congress intended that the factors specified in § 304 are pertinent to effluent limitations established under § 301. Some of the specified factors are of practical applicability only to individual plants, for example "age of equipment and facilities involved." We construe the congressional intent to be that the specified factors shall be applied by the permit issuer in determining whether the presumptively valid effluent limitations should apply to a particular source of discharge. This construction does not derogate the power of the Administrator to issue general regulations fixing presumptively valid effluent limitations on categories.

With reference to the cost-benefit provision Industry contends that EPA must first make an overall cost/benefit analysis and then elaborate how that analysis shall be applied in the consideration of permits for individual plants. We believe that an overall cost/benefit analysis for each subcategory satisfies the statutory requirements. Such

an analysis for each of the many thousands of dischargers and permit applicants would be impractical for general regulations. In acting on permit applications, the issuer will properly consider cost/benefit analysis along with the other factors specified in § 304(b).

We reject the argument of Industry that benefits must be quantified in monetary terms. Nothing in the Act requires this action.

Industry says that as to existing sources EPA is confined to "end of the pipe" treatment systems. The Act does not so provide. The provisions applicable to both the 1977 and 1983 phases, § 304(b)(1)(B) and (2)(B) refer to "measures and practices" and direct the Administrator to consider "process changes."

Both the mentioned subsections require EPA to consider "non-water quality environmental impact (including energy requirements)." Pollutant wastes which may not be recycled and for which there is no commercial market have to be disposed of in some other way. They may be discharged into water, vented into the air, or collected in a land-fill. Air discharge brings into play the Clean Air Act, 42 U.S.C. § 1857 et seq. Land-fills present local problems and the application of local laws. We believe that EPA has given adequate consideration to the non-water environmental impact except in the cases of certain subcategories to be mentioned later.

Energy requirements present a serious problem in the light of the existing energy crisis with spiraling prices. Unquestionably, many of the regulations will require the use of more energy. EPA and Industry are in sharp dispute over the amounts and costs of the energy required. We do not know which is right. One thing is certain. Costs to the consumers will rise. So far as the inorganic chemical manufacturing category is concerned we are satisfied with the EPA actions, except insofar as later mentioned subcategories raise problems.

For the 1977 phase the requirement is "the application of the best practicable control technology currently avail-

able." § 301(b)(1)(A). The Industry reply brief in Nos. 74-1261 etc. at 44 acknowledges that "the 1977 effluent guidelines can be based on the performance of the best plants or performance achieved by no plant if the Agency finds that the level of achievement in the subcategory is uniformly inadequate." Industry conceives of problems which will arise when plants in a subcategory use different processes. This matter is best considered in connection with the specific subcategories.

For the 1983 phase the requirement is "application of the best available technology economically achievable." § 301 (b)(2)(A). In this regard Industry concedes, Ibid., that "the Agency may look to the best performer and even assess technologies that have not been applied." The concern of Industry is the adequacy of the variance provisions. We will not assume inadequacy. The problem can be considered when and if it arises.

For new sources, § 306(a)(1), standards of performance must be both "available" and "demonstrated." Problems connected with new source standards for specific subcategories will be dealt with in our discussion of those subcategories.

With the exceptions noted, we believe that EPA has satisfied the statutory procedural requirements.

(d) Relationship of the three steps.

The problem here is the relationship of the 1977 limitations, the 1983 limitations, and the new source standards. The orderly progression is (1) 1977 limitations, (2) new source standards, and (3) 1983 limitations. No instance is called to our attention in which the 1977 limitations are more strict than the new source standards or the 1983 limitations. At times the 1977 limitations are the same as the new source standards.

The difficulty arises from uncertainty as to the relationship of the 1983 limitations to the new source standards. Industry says that the 1983 limitations may not be more

stringent than the new source standards. We are thrust into another area of confusion. Section 306(d) prescribes a grace period. It concerns "standard of performance," a term specifically defined in § 306(a)(1). We do not know whether Congress intended to equate "effluent limitations" as used in § 301(b) and defined in § 502(11) with "standard of performance." Nor do we know the intent of Congress with reference to the applicability of the grace period to plants the construction of which began after the passage of the Act in 1972 and before the promulgation of the regulations in 1974. All we can say is that nothing pertaining to § 306(d) is before us. The construction and application of § 306(d) is for decision when a specific controversy is presented.

Improvements in the techniques of waste disposal can be reasonably expected by 1983. Except for such situations as are later determined to be within the § 306(d) grace period, plants which go on the line between the passage of the Act and 1983 are subject to the 1983 limitations.

The language of the Act is such that the 1983 limitations, to some extent, must be anticipatory. We do not know what will be "the best available technology economically achievable" in 1983. See § 301(b)(2)(A). Section 304(b) requires the publication of regulations within one year. In 1974 the Administrator promulgated regulations setting forth 1983 limitations. Industry was under the statutory compulsion of bringing a petition for review within 90 days of promulgation. See 509(b)(1). The circumstances thus require speculation as to what will be the 1983 technology.

We are presented with an anomaly. We cannot determine the validity of an unknown. Industry is entitled to know the limitations which will confront it in 1983. By its regulations EPA has told Industry what to expect in 1983 and by so doing has given Industry lead time within which to make such changes as may be necessary. For practical purposes our review at this time must be confined to a determination of whether the record discloses a rea-

sonable basis for belief that a new technology will be available and economically achievable.

Clarification may come through EPA review and revision of the regulations as provided in §§ 301(d) and 304(b). We assume EPA compliance with these provisions. See *United States v. Chemical Foundation, Inc.*, 272 U.S. 1, 14-15 and *Douglas v. Noble*, 261 U.S. 165, 170. Section 301(c) authorizes the Administrator to modify the 1983 requirements for a permit application filed after July 1, 1977. We assume that if industry believes that the technology on which the 1983 limitations are based is not available or economically achievable, it will seek modification. We realize that the modification procedure of § 301(c) does not include situations where permit applications were filed before July 1, 1977. If any controversy arises whether a point source, the application for which is filed before July 1, 1977, is entitled to a modification of the 1983 limitations, that controversy will then have to be determined. It is not now before us. Our concern is with general regulations.

Section 509(b)(1) permits a petition for review to be filed after the mentioned 90 day period "only if such application is based solely on grounds which arose after the ninetieth day." This provision, when coupled with the review and revision provisions of §§ 301(d) and 304(b) provides a mechanism for future administrative and judicial action on the basis of actual rather than anticipated conditions.

In our later discussion of the 1983 requirements, we recognize the problems which have been mentioned. In each instance where we set aside a 1983 regulation we do so on the basis of technical objections, either conceded or presently apparent. We decline to engage in speculation.

(e) Arbitrary and capricious action.

EPA actions in promulgating the regulations may not be arbitrary, capricious, or an abuse of discretion. Except as noted in our discussion of specific subcategories, we believe that the regulations do not violate the stated principle.

II
VALIDITY OF PARTICULAR REGULATIONS PERTAINING TO MORE THAN ONE SUBCATEGORY

(a) Definitions of "process waste water" and "process waste water pollutants."

Each of the attacked subparts of 40 C.F.R. Part 415 incorporates the definitions found in 40 C.F.R. § 401. "Process waste water" is defined by § 401.11(q) and "process waste water pollutants" by § 401.11(r).

With particular reference to chlorine, EPA says (Brief in Nos. 74-1261 etc., p. 97) that it will amend the "process waste water" definition "to make clear that it does not extend, in the context of no discharge standards, to unavoidable leaks and spills."

With particular reference to nitric acid, EPA says (Brief in Nos. 74-1261, etc. at 118) that:

> "***the Agency is preparing a proposed amendment to the definition of 'process waste water' and 'process waste water pollutant.' (40 C.F.R. sec. 401.11(q)(r)) which will make clear that in the case of point sources subject to a no discharge limitation, water which has had only incidental contact with raw materials, intermediate products, finished products, byproducts or waste products will not constitute process waste water."

Accordingly, § 401.11(q) and (r) are set aside and remanded for reconsideration.

(b) Catastrophic rainfall.

A number of the regulations pertaining to 1983 limitations and new source standards contain exceptions relating to catastrophic rainfall. For example §§ 415.93(b)(2) and 415.95(b)(2), relating respectively to 1983 limitations and new source standards for hydrogen peroxide production, provide:

> "A process waste water impoundment which is designed, constructed, and operated so as to contain the precipitation from the 25 year, 24 hour rainfall event as established by the National Climatic Center, Na-

> tional Oceanic and Atmospheric Administration for the area in which such impoundment is located may discharge that volume of process waste water which is equivalent to the volume of precipitation that falls within the impoundment in excess of that attributable to the 25 year, 24 hour rainfall event, when such event occurs."

The first difficulty is with the word "impoundment." We are not sure what it means in the context in which it is used. Industry's objections go to the extent of the included area. In its discussion of hydrofluoric acid EPA says (Brief in Nos. 74-1261, etc. p. 106) that it will propose an amendment to 40 C.F.R. § 415.81 defining the term "within the impoundment." We believe that the new definition should apply to all regulations now using the term.

Industry objects to the test stated as "the 25 year, 24 hour rainfall event." It says that this was added in the final regulations and it did not have an opportunity to comment. We are referred to nothing in the record which justifies the test. The problem is for the experts and should be solved administratively rather than judicially. Industry says that in an area where precipitation exceeds evaporation the regulation requires an infinitely expanding pond to contain all rainfall (less evaporation) that may fall other than during a catastrophic storm. Absent facts of which we are not aware, the position of industry appears correct. The catastrophic rainfall provisions should be the same for the 1983 phase and for new sources. Rain will affect each.

The various regulations pertaining to catastrophic rainfall are set aside and remanded for reconsideration. The specific regulations affected will be mentioned in the discussion of pertinent subcategories.

III
SPECIFIC SUBCATEGORIES

(1) Chlorine—40 C.F.R. Part 415, Subpart F.

This subpart relates to discharges of pollutants from the production of chlorine and sodium or potassium hydroxide

by the diaphragm cell process and by the mercury cell process. The regulations provide specified limits for pollutant discharge at the 1977 deadline (§ 415.62) and for new sources (§ 415.65). For the 1983 deadline the requirement is no discharge (§ 415.63).

The record pertaining to the 1983 no discharge provision presents unexplained inconsistencies. The Development Document says, App. 5778, that, "There is no known problem which has not been solved by at least one plant of this survey." Contrariwise, EPA in its preamble for proposed rulemaking effluent limitations guidelines for the inorganic chemical industry says, 38 Fed. Reg. 28180, with reference to chlorine plants using the diaphragm and mercury process that "no plants are currently achieving no discharge of process waste water pollutants." If EPA has any explanation of the inconsistency, it is so hidden in a mass of technical detail that we cannot find it.

We have heretofore discussed the relationship between the three steps, 1977, 1983, and new sources. We have also mentioned the waste water definitions and the catastrophic rainfall provisions, all of which are pertinent to § 415.63. Until we know what changes EPA will make and what will be the effect thereof, there is no need to consider the problem further.

Section 415.63 is set aside and remanded for reconsideration.

(2) Hydrochloric Acid—40 C.F.R. Part 415, Subpart G.

This subpart relates to discharges of pollutants from the production of hydrochloric acid by direct reaction of chlorine and hydrogen. The regulations provide for no discharge of pollutants by existing plants at both the 1977 (§ 415.72) and 1983 (§ 415.73) deadlines and by new sources (§ 415.75).

After referring to the waste water definitions, EPA says (Brief in Nos. 74-1261 etc. at 104-105) that it did not intend to subject hydrochloric acid plants to no discharge stan-

dards "for occasional sources of waste." Accordingly, a remand is required.

We doubt the propriety of EPA's use of Hooker Chemical plant as exemplary to support the no discharge requirements. The record shows that the Hooker plant has no discharge of pollutants "during normal operation" but does during "start-up of production runs." The EPA explanation of the technology applicable to the start-up discharges is not convincing and we doubt whether Hooker can be treated as an exemplary plant. On remand, EPA must clearly articulate its position in these regards.

Sections 415.72, 415.73 and 415.75 are set aside and remanded for reconsideration.

(3) Hydrofluoric Acid—40 C.F.R. Part 415, Subpart H.

This subpart relates to discharges of pollutants from the production of hydrofluoric acid. The regulations provide specific limits for pollutant discharge at the 1977 deadline (§ 415.82) and for no discharges at the 1983 deadline (§ 415.83) and for new sources (§ 415.85). Provisions relating to catastrophic rainfall are included in each of the mentioned regulations.

On January 9, 1975, EPA published proposed new regulations for hydrofluoric acid. See 40 Fed. Reg. 1712. The comment period has expired but we do not know what will be the ultimate result. EPA does not expect to promulgate final amendments before March, 1976. In the circumstances, the preferable procedure is to nullify the existing regulations.

Sections 415.82, 415.83, and 415.85 are set aside and remanded for reconsideration.

(4) Hydrogen Peroxide—40 C.F.R. Part 415, Subpart I.

This subpart relates to discharges of pollutants from the production of hydrogen peroxide by the electrolytic process and by the oxidation of alkyl hydroanthraquinones (organic process). The regulations provide specified limits

for pollutant discharge at the 1977 (§ 415.92) deadline and no discharge at the 1983 (§ 415.93(a)) deadline and for new sources (§ 415.95(a)) for plants using either process. As to plants using the electrolytic process the no discharge provisions for 1983 and for new sources contain catastrophic rainfall exceptions (§§ 415.93(b)(2) and 415.95 (b)(2)).

EPA says (Brief in Nos. 74-1261 etc. at 192 and Brief in Nos. 74-1296 etc. at 42) that it will reevaluate the 1983 and new source provisions pertaining to the organic process (§§ 415.93(a) and 415.95(a)).

Industry attacks the 1983 no discharge provision for plants using the electrolytic process. The FMC plant at Vancouver, Washington, is the only plant in the United States using this process for hydrogen peroxide production. The purity of its product permits it to compete with plants using the organic process. EPA's analysis (App. 1182-1183) shows that the differences in quality of influent well water and effluent discharge into the Columbia River are negligible. The discharges are environmentally insignificant. We cannot comprehend how a change from the present process to the EPA technology, evaporation and landfill, will be beneficial. Because EPA is to reexamine its waste water definitions and because of the difficulties which we have noted with the catastrophic rainfall provisions, this regulation must be remanded. On reconsideration, EPA must give consideration to the total environmental impact.

The no discharge regulation for new electrolytic plants must also be remanded. Our comments on the definitions of waste water and on the catastrophic rainfall provisions are as applicable here as they are to the 1983 requirements for existing plants.

Sections 415.93 and 415.95 are set aside and remanded for reconsideration.

(5) Nitric Acid—40 C.F.R. Part 415, Subpart J.

This subpart relates to the discharges of pollutants from the production of nitric acid in concentrations up to 68 per-

cent. The regulations provide for no discharges at the 1977 and 1983 deadlines for existing plants (§§ 415.102 and 415.103) and for new sources (§ 415.105).

EPA concedes, with particular reference to nitric acid, that the waste water definitions must be reconsidered both as to existing plants (§§ 415.102 and 415.103) and as to new sources (§ 415.105). See EPA brief in Nos. 74-1261 etc. at 117-118 and in Nos. 74-1296 etc. at 66-67.

On the recycling problem, the record is so confused that we cannot say with any certainty which party is right. Hopefully, the remand will result in clarification. On the cost analysis, Industry objects to EPA's use of information obtained from sulfuric acid plants. EPA responds that in the time available it had no alternative. Now, it has had more time and should specify the facts and reasons on which its conclusions are based.

Sections 415.102, 415.103 and 415.105 are set aside and remanded for reconsideration.

(6) Sodium Carbonate—40 C.F.R. Part 415, Subpart O.

This subpart relates to discharges of pollutants from the production of sodium carbonate by the Solvay process. The regulations applicable to existing sources both at the 1977 and 1983 deadlines (§§ 415.152 and 415.153) specify the permissible discharges with reference to both TSS and pH. TSS means total suspended nonfilterable solids. § 401.11 (s)(5). The term pH is a logarithmic expression of the concentration of hydrogen ions in water, with 7 pH indicating a neutral condition. Lower pH values show acidity and higher values alkalinity. For new sources the requirement is no discharge (§ 415.155).

EPA admits errors in the TSS requirements (Brief in Nos. 74-1261 etc. at 134) and says (Ibid. at 135) it will "not oppose a remand of the suspended solids limitations in 40 C.F.R. Section 415.152 and 415.153 for consideration of the appropriate flow rate and the projected economic impact on the industry."

Industry contends that the pH requirement should also be remanded. We agree. Nothing in the record sustains the EPA conclusion that neutralization of the inherently alkaline effluent from a sodium carbonate plant is practicable or economically achievable. The justification in the brief is no substitute for agency action not sustained by the record. Also, the cost of neutralization should be considered along with the cost of removal of suspended solids. On remand EPA should make clear the technologies which it deems available.

The regulation for new sources mandates that there be no discharge. This is in conflict with the EPA statment, 38 Fed. Reg. 28179, that:

> "§ ***no technology is available and economically achievable for the elimination of discharge from Solvay plants."

The EPA brief comments (Brief in Nos. 74-1296 at 53) that "The Solvay process generates staggering quantities of waste products." It also says (Ibid.):

> "As has been seen, there are practicable alternatives to discharge from a new Solvay plant if one is ever built. The Agency properly set the standard of performance fo[r th]is unlikely plant."

The EPA alternatives are (1) use of deep well injections and (2) production of sodium carbonate by the Trona ore process. Both of these present non-water environmental problems. Deep-well injection raises both federal and state problems and has been the subject of EPA litigation. See *e.g. United States v. Armco Steel Corporation*, S.D. Tex., 333 F. Supp. 1073. Trona plants present an air pollution problem which EPA has recognized. See 39 Fed. Reg. 25339.

Industry argues that EPA has no statutory power to force industry to use a certain process. There is no need to explore the legal ramifications of this contention. It is enough to say that the technology on which EPA bases its new source standards is neither available nor demonstrated when regard is had for non-water environmental impact.

Sections 415.152, 415.153, and 415.155 are set aside and remanded for reconsideration.

(7) Sodium Dichromate—40 C.F.R. Part 415, Subpart Q.

This subpart relates to discharges of pollutants resulting from the production of sodium dichromate and by-product sodium sulfate. The regulations provide for permissible, specified discharges by existing plants at the 1977 deadline (§ 415.172) and by new sources (§ 415.175). No pollutant discharge is permitted at the 1983 deadline except discharges attributable to catastrophic rainfall (§ 415.173).

Industry attacks the 1983 no discharge provision. In its discussion of sodium dichromate, EPA said, 39 Fed. Reg. 9614:

> "The proposed new source performance standards were based on evaporation to attain no discharge of process waste water pollutants. Considering nonwater environmental aspects, the new source performance standards have been revised to require good water conservation and best practicable technology."

EPA's rationalization of its actions is not convincing. It says (Brief, Nos. 74-1261 etc. at 171) that "[a]s to the reasonableness of the Administrator's conclusion that evaporation represents an available technology for 1983, there can be no serious challenge." It then says (Ibid. at 173) that its new source provision was in response to Industry's concern that "evaporation had not been sufficiently demonstrated on the volumes encountered in the manufacture of sodium dichromate." It also says (Ibid. at 174) that it deferred imposition of zero discharge for existing sources until 1983 "because of its reassessment of the technological development of evaporative systems on waste loads as large as those generated by this subcategory, as well as energy consumption demands in a time of general concern about energy supply." We are confused rather than convinced. The manufacture of sodium dichromate produces large quantities of waste discharges. Disposition of these wastes by evaporation imposes a severe demand on use of energy.

EPA does not disclose what evaporative technology it uses in making its cost analysis, its energy study, or its consideration of the non-water environmental impact.

In essence EPA asks us to have faith in its expertise and, on that ground, uphold its actions. Judicial review must be based on something more than faith and respect. Confidence and deference do not substitute for reasoned analysis sustained by the record. In the circumstances we see no need to explore the technical arguments of the parties going to environmental impact, costs, and energy requirements. We are hopeful that on remand EPA will give further consideration to these problems.

Section 415.173 is set aside and remanded for reconsideration.

(8) Sodium Metal—40 C.F.R. Part 415, Subpart R.

This subpart relates to discharges of pollutants from the production of sodium metal by the Downs cell process. The regulations provide specified limits for pollutant discharge at the 1977 deadline (§ 415.182) and no discharge at the 1983 (§ 415.183) deadline and for new sources (§ 415.185). The no discharge provisions for 1983 and for new sources contain catastrophic rainfall exceptions (§§ 415.183(b) and 415.185(b)).

The pertinent Industry brief is presented by Stauffer Chemical Company. EPA says that Stauffer has no standing because it is not a producer. Stauffer is admittedly a purchaser and user of sodium metal. Section 509(b)(1) of the Act authorizes review "by any interested person." Section 502(5) defines "person" to include "a corporation." Accordingly Stauffer has the requisite standing.

Industry attacks the 1977 requirement that the TSS average daily discharge shall not exceed 23 kilograms per 1,000 kilograms of product. EPA says that this can be achieved by use of "well designed settling basins." With general reference to the inorganic chemical industry, the Development Document says that the performance and cost of

settling basins "depends on the amount of waste involved and the settling characters of the solids suspended." The trouble is that EPA does not demonstrate how this general principle applies to sodium metal. EPA exemplary plant, the DuPont plant at Memphis, does not achieve the requirement of the regulation.

Industry says that EPA imposed the no discharge limit without regard for the environmental impact or the energy costs, factors which § 304(b)(2)(B) of the Act requires EPA to specify. Specifically, Industry says that EPA did not take into account the cost of solid waste disposal and failed to consider energy requirements. The unsatisfactory EPA response is that it did pay attention to these factors and that it developed estimates for all treatment measures of general application to the inorganic chemical industry. It does not relate any of these to the particular conditions found in the sodium metal industry.

EPA concedes (Brief in Nos. 74-1261 etc. at 167) that the Development Document does not "include significant energy costs associated with no discharge." It goes on to say that it estimated the capital cost of attaining no discharge. An estimate of capital cost is not consideration of the environmental impact or of the energy requirement.

Because we are convinced that the 1983 regulation must be set aside, we need not delve into the detailed attack made by Industry on the EPA technology or the complex answers thereto. On remand EPA must do a better job of articulating the facts and reasons upon which its conclusions are based.

EPA justifies its no discharge requirement for new sources by reliance on the "technological basis" for the 1983 limitations (Brief in Nos. 74-1296 etc. at 30). Because we set aside the 1983 regulation, no need exists for further discussion of the problem in connection with new sources.

Our earlier action in regard to the catastrophic rainfall provisions applies to both the 1983 and new sources provisions.

Sections 415.182, 415.183 and 415.185 are set aside and remanded for reconsideration.

(9) Sodium Silicate—40 C.F.R. Part 415, Subpart S.

This subpart relates to the discharge of pollutants from the production of sodium silicate. The regulations applicable to existing sources by July 1, 1977, specify the permissible discharges. § 415.192. For 1983 and for new sources no pollutant discharge is permitted. §§ 415.193 and 415.195.

Consideration of the sodium silicate regulations stretches our patience to the breaking point. EPA did not furnish the data on its exemplary plant until after the Industry's first brief. After receipt of the data, counsel for Industry wrote counsel for EPA expressing concern over the fact that the EPA contractor (Industry reply brief in Nos. 74-1261 etc. at App. F):

> "viewed the plant as having exemplary recycle (when the contractor's sheets do not mention recycle) and evaporation (in an area where precipitation is twice the evaporation rate)."

After mentioning other matters the letter said:

> "We hope that you will agree that the issues as to the record and the basis for the sodium silicate guidelines and standards of performance are matters better resolved by administrative than by judicial consideration."

We agree with counsel. The strained effort in the EPA brief to justify the agency actions leaves us in a state of extreme confusion. We have examined every record reference made by EPA. They are cryptic, mystic, and enigmatic. If there is to be any worthwhile judicial review of agency action, that action must be presented and supported in a manner capable of judicial understanding. It is enough to say that EPA has not shown that its technology is available, achievable, or demonstrated. The mandates of the Act have not been obeyed.

Sections 415.192, 415.193, and 415.195 are set aside and remanded for reconsideration.

(10) Sulfuric Acid—40 C.F.R. Part 415, Subpart U.

This subpart relates to discharges of pollutants from the production of sulfuric acid in single and double adsorption plants. The regulations provide for no discharge of pollutants by existing plants at both the 1977 (§ 415.212) and 1983 (§ 415.213) dates and by new sources (§ 415.215).

Industry objects to the inclusion of plants using certain processes. On January 31, 1975, EPA amended the applicability section (§ 415.210) of this subcategory. See 40 Fed. Reg. 5523. We are not told what is the effect of the amendment. Without this knowledge we cannot evaluate the regulations as they now read.

Also we have the problem of the definitions of "process waste water" and "process waste water pollutants." These are found in § 401.11(q) and (r) which we have set aside and remanded. EPA should assess the effect of the definitions on sulfuric acid plants. Because we do not know what will be the result of changed definitions on the no discharge requirements of §§ 415.212 and 415.213, those regulations are set aside and remanded for reconsideration.

Industry and EPA are in apparent agreement that single adsorption plants which are required to install tail gas scrubbers should not be held to the zero discharge requirement (Briefs in Nos. 74-1261 etc., EPA at 126 and Industry reply brief at 97). EPA says that such a plant would be entitled to a variance from the 1977 requirement and that the variance may be given by the permit issuer under the provision of § 415.212. Industry points out that the variance procedure is not applicable to the 1983 requirement. It would appear that the variance and review provisions of § 301(c) and (d) of the Act furnish adequate protection to Industry. Because EPA must reconsider the zero discharge provisions, it might be that the solution is to exclude the plants in question from regulation coverage. On remand EPA should consider this problem.

Industry raises two points in connection with the no discharge requirement for new sources. The first refers to the definition of process waste water which has been discussed in connection with other categories. With relation to sulfuric acid EPA concedes (Brief in Nos. 74-1296 etc. at 61) that "no discharge of contaminated cooling water is practicable for all plants at all times." The second relates to the EPA redefinition of the applicability of the sulfuric acid category. In this regard our statements in connection with existing sources apply also to new sources.

Sections 415.210, 415.212, 415.213, and 415.215 are set aside and remanded for reconsideration.

(11) Titanium Dioxide—40 C.F.R. Part 415, Subpart V.

This subpart originally related to discharges of pollutants from the production of titanium dioxide by the sulfate process and by the chloride process. For each process the regulations specify permissible discharges for all three steps. §§ 415.222, 415.223, and 415.225.

A 1975 amendment to the applicability clause, 40 Fed. Reg. 5523-24, removed applicability "to wastes resulting from discharges from production by processes in which beneficiation of raw ilmenite ore and chlorination are inseparably combined in the same process step." We understand that the amendment affects the chloride process and we are not told what will be its effect. Industry makes the reasonable request that the court remand the chloride process regulations insofar as they apply to "a process that combines beneficiation of low grade ilmenite ore and chlorination." Industry reply brief in Nos. 74-1261 etc. at 163. The request is granted.

With regard to the sulfate process, the charges and countercharges of the parties are more theatrical than informative. The discharge of pollutants from plants using the sulfate process presents a serious problem. This fact does not excuse EPA from failing to disclose and articulate, in an understandable manner, its course of inquiry, anal-

ysis and reasoning. EPA relies on after-the-fact rationalization and argument in its brief. The brief in turn places heavy reliance on, and six times cites for record support, "App. 2278." This is a reproduction of a document which was prepared by some undisclosed person and which contains penciled notes made by an unknown writer. The cryptic allusions mean nothing to us.

The technology used by EPA to justify its regulations is not shown to be in use at any plant, either existing or pilot. EPA's continued reference to the American Cyanamid plant is unimpressive. That plant is not using the technology on which EPA relies, and it intends to use a proprietary treatment process which it refuses to disclose because of a confidentiality agreement. EPA has not demonstrated that the technology claimed to support its regulations is either available, practicable, economically achievable, or demonstrated. In the circumstances it is not necessary to explore the lengthy, technical arguments of the parties relating to costs and energy requirements.

Sections 415.220, 415.222, 415.223, and 415.225 are each set aside and remanded for reconsideration.

IV

The following regulations, all contained in 40 C.F.R., are severally set aside and remanded for reconsideration in the light of this opinion:

General

401.11(i)—Definition of "effluent limitation."

401.11(q)—Definition of "process waste water."

401.11(r)—Definition of "process waste water pollutants."

Chlorine

415.63—1983 step.

Hydrochloric Acid

415.72—1977 step.

415.73—1983 step.

415.75—New sources.

Hydrofluoric Acid

415.82—1977 step.

415.83—1983 step.

415.85—New sources.

Hydrogen Peroxide

415.93—1983 step.

415.95—New sources.

Nitric Acid

415.102—1977 step.

415.103—1983 step.

415.105—New sources.

Sodium Carbonate

415.152—1977 step.

415.153—1983 step.

415.155—New sources.

Sodium Dichromate

415.173—1983 step.

Sodium Metal

415.182—1977 step.

415.183—1983 step.

415.185—New sources.

Sodium Silicate

415.192—1977 step.

415.193—1983 step.

415.195—New sources.

Sulfuric Acid

415.210—Applicability.

415.212—1977 step.

415.213—1983 step.

415.215—New sources.

Titanium Dioxide

415.220—Applicability.

415.222—1977 step.

415.223—1983 step.

415.225—New sources.

JUDGMENT

United States Court of Appeals

FOR THE FOURTH CIRCUIT

No. 74-1261

E. I. duPont de Nemours & Co.,

Petitioner,

Chamber of Commerce of the United States of America,
Amicus Curiae.

Allegheny Power System, Inc., et al,
Amicus Curiae.

New Jersey Zinc Company,
Amicus Curiae.

American Petroleum Institute and Eleven Member Companies. (Ashland Oil, Inc.; Continental Oil Company; Exxon Corp.; Gulf Oil Corp.; Phillips Petroleum Company; Shell Oil Co.; Standard Oil Co. of California; Standard Oil Co. of Ohio; Sun Oil Co. of Pennsylvania; Texaco, Inc.; Union Oil of California)
Amicus Curiae.

RMI, Inc.
Amicus Curiae.

versus

Russell E. Train, as Administrator, Environmental Protection Agency,
Respondent.

Natural Resources Defense Council,
Amicus Curiae.

On Petition For Review Of An Order Of The Environmental Protection Agency

This Cause *came on to be heard upon the petition of* E. I. duPONT de NEMOURS & Company, *for review of*

an order issued against it by the Environmental Protection Agency on March 4, 1974; upon a certified list in lieu of a transcript of the record; and the said cause was argued by counsel.

ON CONSIDERATION WHEREOF, *it is ordered, adjudged and decreed by the United States Court of Appeals for the Fourth Circuit, that the following regulations, all contained in 40 C.F.R., are severally set aside and remanded for reconsideration in light of this opinion.*

General

401.11(i)—Definition of "effluent limitation."

401.11(q)—Definition of "process waste water."

401.11(r)—Definition of "process waste water pollutants."

Chlorine

415.63—1983 step.

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Sodium Metal

415.182—1977 step.

415.183—1983 step.

415.185—New sources.

Sodium Silicate

415.192—1977 step.

415.193—1983 step.

415.195—New sources.

Sulfuric Acid

415.210—Applicability.

415.212—1977 step.

415.213—1983 step.

415.215—New sources.

Titanium Dioxide

415.220—Applicability.

415.222—1977 step.

415.223—1983 step.

415.225—New sources.

/s/ WILLIAM K. SLATE, II
Clerk

Supreme Court of the United States

No. 75-978

E. I. du Pont de Nemours and Company
et al.,

Petitioners,

v.

Russell E. Train, Administrator, Environmental
Protection Agency, *et al.*

Order Allowing Certiorari. Filed April 19, 1976

The petition herein for a writ of certiorari to the United States Court of Appeals for the Fourth Circuit is granted.

Supreme Court of the United States

No. 75-1473

E. I. du Pont de Nemours and Company
et al.,

Petitioners,

v.

Russell E. Train, Administrator,
Environmental Protection Agency

Order Allowing Certiorari. Filed June 21, 1976

The petition herein for a writ of certiorari to the United States Court of Appeals for the Fourth Circuit is granted. The case is consolidated with No. 75-1705 and a total of one hour is allotted for oral argument. The case is set for oral argument in tandem with No. 75-978, E. I. du Pont de Nemours and Company v. Train.

Supreme Court of the United States

No. 75-1705

Russell E. Train, Administrator,
Environmental Protection Agency,

Petitioner,

v.

E. I. du Pont de Nemours and Company
et al.

Order Allowing Certiorari. Filed June 21, 1976

The petition herein for a writ of certiorari to the United States Court of Appeals for the Fourth Circuit is granted. The case is consolidated with No. 75-1473 and a total of one hour is allotted for oral argument. The case is set for oral argument in tandem with No. 75-978, E. I. du Pont de Nemours and Company v. Train.

APPENDIX
EXHIBIT VOLUME

In the Supreme Court of the United States

OCTOBER TERM, 1976

No. 75-978

E. I. du Pont de Nemours and Company, *et al.*, Petitioners,

v.

Russell E. Train, *as Administrator, Environmental Protection Agency, et al.*, Respondents

On Writ Of Certiorari To The United States Court Of Appeals For The Fourth Circuit

Petition for Certiorari Filed January 12, 1976
Certiorari Granted April 19, 1976

In the Supreme Court of the United States

OCTOBER TERM, 1976

No. 75-978

E. I. du Pont de Nemours and
Company, *et al.*, Petitioners,

v.

Russell E. Train, *as Administrator, Environmental Protection Agency, et al.*, Respondents

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On Writ Of Certiorari To The United States Court Of Appeals For The Fourth Circuit

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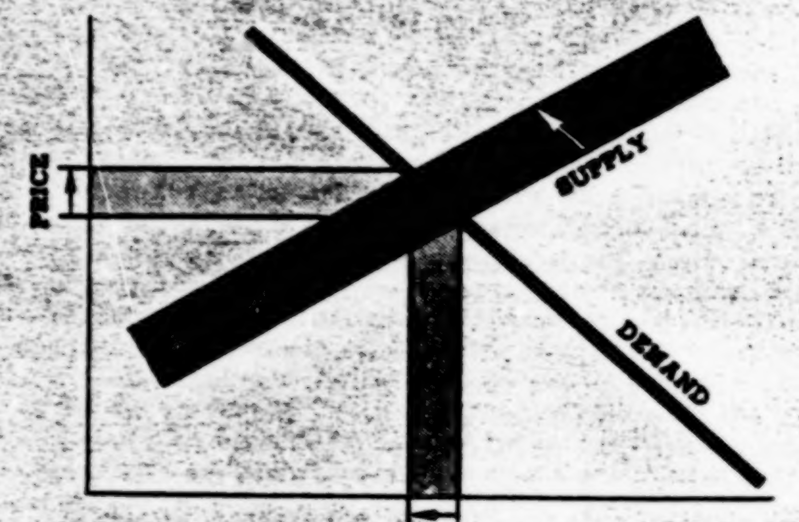
*The pagination of the Administrative Record by EPA is adopted for the Exhibit Volume.

EPA-230/2-74-015
APRIL 1974

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES FOR THE INORGANIC CHEMICALS INDUSTRY

Phase I



U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Planning and Evaluation
Washington, D.C. 20460

EPA-230/2-74-015

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES FOR THE INORGANIC CHEMICALS INDUSTRY

April 1974

Contract No. 68-01-1541

Office of Planning and Evaluation
Environmental Protection Agency
Washington, D.C. 20460

PREFACE

The attached document is a contractor's study prepared with the supervision and review of the Office of Planning and Evaluation of the U.S. Environmental Protection Agency (EPA). Its purpose is to provide a basis for evaluating the potential economic impact of effluent limitations guidelines and standards of performance established by EPA pursuant to sections 304(b) and 306 of the Federal Water Pollution Control Act.

The study supplements an EPA technical "Development Document" issued in conjunction with the promulgation of guidelines and standards for point sources within this industry category. The Development Document surveys existing and potential waste treatment and control methods and technologies within this category and presents the investment and operating costs associated with various control technologies. This study supplements that analysis by estimating the broader economic effects (including product price increases, continued viability of affected plants, industry growth and foreign trade) of the required application of certain of these control technologies.

This study has been submitted in fulfillment of Contract No. 68-01-1541, Task No. 30 by Arthur D. Little, Inc. Work was completed as of April 1974. The study is based primarily upon an earlier study, also prepared by Arthur D. Little, Inc., entitled "Economic Analysis of Proposed Effluent Guidelines for Inorganic Chemicals, Alkali and Chlorine Industries." The earlier report was circulated in conjunction with the publication in the Federal Register of a notice of proposed rulemaking under sections 304(b) and 306 for the subject point source category. The analysis contained in the original study has been revised based upon information received during the period of time between publication of the notice of proposed rulemaking and the promulgation of the final regulation. Because of the constraints of time, the control and treatment costs analyzed in this study may not in all instances be identical to those associated with the requirements of the promulgated regulation. However, those differences, when they exist, are minor insofar as the final conclusions of the study are concerned.

This report represents the conclusions of the contractors. It has been reviewed by the Office of Planning and Evaluation and approved for publication. Approval does not signify that the contents necessarily reflect the views of the Environmental Protection Agency. The study has been considered, together with the Development Document, information received in the form of public comments on the proposed regulation, and other materials in the establishment of final effluent limitations guidelines and standards of performance.

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I. SUMMARY

A. INTRODUCTION

The following report is submitted in compliance with Task Order No. 30 to BOA No. 68-01-1541, "Economic Impact of 1972 Federal Water Pollution Control Amendments on the Inorganic Chemical Industry." As outlined in our proposals, this report deals with 24 inorganic chemicals, including the nine discussed in the initial study;[1]

Aluminum Chloride
Aluminum Sulfate
Chlorine and Caustic Soda
Hydrochloric Acid
Hydrofluoric Acid
Hydrogen Peroxide
Lime
Nitric Acid
Sulfuric Acid

as well as the six inorganic chemicals studied in depth;

Calcium Carbide
Sodium Sulfate
Titanium Dioxide (Chloride)
Titanium Dioxide (Sulfate)
Sodium Chromate and Bichromate
Potassium Bichromate

and the nine additional products briefly reviewed in a subsequent analysis;

Sodium Bicarbonate
Solar Salt
Evaporated Salt
Sodium Silicate
Sodium Metal
Sodium Sulfite
Calcium Chloride
Synthetic Soda Ash and
Potassium Sulfate.

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[1] "Initial Analysis of the Economic Impact of Water Pollution Control Costs Upon Ten Inorganic Chemicals," report to Environmental Protection Agency by Booz, Allen Public Administration Services, Inc., January 5, 1973.

The objective of this study was to analyze the economic impact of the costs of water pollution abatement requirements for the specified products, using the data for the nine initial study products contained in the initial impact study, new water treatment cost data provided by EPA and the industry information developed for the major study products and the additional study products by the contractor.

B. IMPACT ANALYSIS METHODOLOGY

In order to assess the impact of water treatment costs on the inorganic chemicals covered in this report, we have developed an analytical framework to arrive at the impact judgment. In addition to providing us with a systematic method to weigh each of the factors affecting the impact judgment, the methodology also provides a format by which the basis for our conclusions are clearly presented.

The basic premise behind the methodology is that a producer faced with new investment in water treatment facilities could (1) continue to operate by (a) passing on the additional costs through price increases, or (b) absorbing the costs (thereby reducing profits); or (2) shut his plant down. This premise, of course, reduces the impact of increased costs due to water treatment to the simplest terms. In the real world, the result of higher costs most probably would be some combination of these alternatives, e.g., a price hike by the most efficient producer sufficient to recover part of his costs (but not enough to cover most of the costs of the marginal producer), reduced profit margins for the most efficient producer partially offset by an increased market share resulting from plant shutdowns by the marginal producer(s).

The approach we have taken in assessing the impact on each of the inorganic chemicals is to first examine the likelihood that the higher costs imposed on the industry by virtue of new water effluent guidelines will be defrayed, wholly or in part, by higher product prices. If the conclusion is that treatment costs cannot be passed on through price increases, the second part of the impact analysis is to examine the likelihood that some plants in the industry would be forced to shut down, taking into account both economic and noneconomic factors.

1. Price Increase Constraints

The treatment costs per ton before taxes indicate the magnitude of the unit price increase necessary to fully recover all treatment costs (i.e., repay the investment and cover operating costs). The larger the ratio of before-tax unit treatment cost to actual unit selling price, the more difficult it will be to fully recover treatment costs, all things being equal. As indicated, the first question we have addressed is whether conditions in the specific competitive situation would permit price increases. In general, the products' price history and the nature of those prices--whether firm or widely dispersed and discounted--provide a clue

as to the possibility of price increases. More specifically, however, the following factors are those that we have used in arriving at the judgment as to whether price increases are feasible. Except in unusual circumstances, no one factor would be overriding. Rather, the judgment is based on a combination of factors.

Substitute Products (or Processes)--If substitute products exist, price increases to cover the (full) costs of water treatment would be difficult.

Capacity Utilization--If capacity utilization for the industry is low, price increases to cover the (full) costs of treatment would be difficult.

Captive Usage--If there is negligible captive use, price increases to cover the (full) costs of water treatment would be difficult.

Demand Growth--Price increases are more difficult to achieve in a static or declining market than in a growing market.

Foreign Competition--If the market can be served by foreign competitors (particularly if the foreign producers are not faced with added water pollution abatement costs), price increases are less likely.

Abatement Cost Differences--If some plants in the industry will incur substantially higher water pollution abatement expenditures than other plants, they will be less able to pass on the added costs as price increases.

Price Elasticity of Demand--For some products, substantial water pollution abatement costs, if passed on as price increases, could result in reduced demand for the product.

Basis for Competition--If the basis for competition in the industry is primarily price as opposed to service or technology, cost increases will be more difficult to pass on, particularly if there is a significant difference between unit treatment costs between large producers and small producers.

Market Share Distribution--If the market share distribution is fragmented (rather than concentrated, in which case there often is a dominant price leader), price increases are less likely, particularly if treatment costs do not affect all producers fairly equally.

Number of Producers--If the market is served by many producers (increasing the likelihood of manufacturing cost differences, abatement cost differences, etc.), a condition exists constraining price increases.

Although not explicitly listed in the generic model, we have been alert to other factors which might prevail for individual products. For example, the economic importance of a product in the manufacturing costs of derivative products might act as a constraint on price increases.

In assessing the possibiliy of water treatment costs being passed on as titanium dioxide price increases, for instance, we took into account the impact on titanium dioxide demand of the resultant increase in the cost of paint.

2. Plant Shutdown Factors

If treatment costs cannot be passed on as price increases, the simplistic model says that the producer either absorbs them or shuts down his plant. The shutdown decision will involve both economic and strategic (i.e., noneconomic) considerations as follows.

Profitability--The after-tax cost per ton of water treatment compared with unit after-tax net income measures the producer's ability or willingness to absorb the added cost.

Cash Flow--Plants will continue to operate temporarily at essentially zero profitability (if necessary) if the plant is producing a positive cash flow (and has a competitive process and is in a stable or growing market).

Ratio of Investment in Treatment Facilities to Net Fixed Investment--If the new investment in water treatment facilities bulks large in comparison with existing plant investment (and other factors are marginal), a shutdown decision may be in order. In some instances, the availability (and cost) of capital to the producer may influence the shutdown decision.

Integration--The degree of backward or forward integration is a factor in the shutdown decision. A producer (or industry) with a significant raw material position or one using the product for downstream manufacture is less likely to curtail production than a non-integrated producer (or industry).

Chemical Complex--An isolated plant would be unable to take advantage of common treatment facilities.

Other Environmental Problems--If a plant has already commited funds for air pollution, it will be more likely to commit the additional funds necessary for water pollution. Alternately, if a company faces both water and air pollution abatement (and/or unusual OSHA) costs, the magnitude of the environmental costs taken together may prompt plant closing whereas any one taken alone would not.

Emotional Commitment--The emotional commitment of the company to that particular product (taking into account protection of competitive position, prestige, the importance of the product in the company's long-range strategy, etc.) may be a factor in the shutdown decision.

Ownership--Other things being equal (and negative), multi-industry companies are more likely to shut down marginal plants than less-diversified producers. The premise is that the multi-industry producer has other (and better) investment opportunities than the single product company (particularly a privately-held, family business).

C. INITIAL AND MAJOR STUDY PRODUCTS

1. Water Treatment Costs

All of the water treatment costs for the various levels of effluent control shown in this report were taken from the Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the Major Inorganic Products prepared for the EPA under contract number 68-01-1513 dated June 1973. The water treatment costs (on a before-tax basis) by product are summarized in Table 1. Base-level practice (B.L.P.) represents water treatment practices which, in the judgment of the Development Document, are followed by most of the industry and exceeded by exemplary plants. Similarly, exemplary plant practice (E.P.P.) reflects the unit cost of water treatment and control practices at the exemplary plant. Proposed best practicable technology (B.P.T.) reflects the Development Document's estimate of the unit water treatment cost for the product in question based upon the best technically and economically feasible treatment and control technology. Finally, proposed best available technology (B.A.T.) reflects the degree of effluent reduction which must be achieved by July 1, 1983. The unit treatment costs used for any particular level of control in the impact analysis is the incremental cost over B.L.P.

2. Manufacturing Costs and Profitability

In the following report the manufacturing costs and profitability data shown in Table 2 for the "Initial Study Products" were taken from the initial study project. Comparable data for the six "Major Study Products" were developed by the Contractor.

3. Conclusions

In Figure 1 we have compared the incremental (over B.L.P.) water treatment costs estimated in the Development Document to achieve B.A.T. effluent standards as a function of product selling price versus treatment costs as a function of unit profit margin for the inorganic chemicals discussed in this study. Three initial study products do not appear on the figure because data for industry profitability were not developed. For the three products (hydrochloric acid, nitric acid, and hydrogen peroxide), however, unit treatment costs are small so that these products would appear in the lower left-hand corner of the figure. One of the major study products, viz. calcium carbide, has also been left off the figure. With a treatment cost of $1.94 per ton versus a selling price of $90 per ton, the cost/price ratio is a nominal 2.2%. However, since industry profit margins are minimal, the treatment cost as a function of unit margins is very high and falls off the scale of the figure.

Titanium dioxide stand out in this figure as the product where the estimated treatment costs represent the highest proportion of both selling price and profit margin. (For both the chloride and sulfate

TABLE 1

WATER TREATMENT COSTS BY LEVELS OF CONTROL
(Dollars Per Ton of Product)

	Base-Level Practice	Exemplary Plant Practice	Best Practicable Technology	Best Available Technology
Initial Study Products				
Aluminum Chloride	0.00	3.77	3.77	3.77
Aluminum Sulfate	0.79	1.72	1.72	1.72
Chlorine				
(Mercury)	2.14	2.14	2.74	3.00
(Diaphragm)	0.04	0.29	0.29	0.56
Hydrochloric Acid	0.25	0.25	0.30	0.30
Hydrofluoric Acid	3.57	4.04	4.89	12.95
Hydrogen Peroxide				
(Organic)	0.20	0.33	1.06	1.06
(Electrolytic)	0.00	0.75	1.14	1.14
Lime				
(Bag)	0.00	0.00	0.00	0.00
(H_2O Scrubber)	0.00	1.28	1.28	1.28
Nitric Acid	0.00	0.22	0.22	0.22
Sulfuric Acid				
(Burning)	0.05	0.10	0.17	0.17
(Regen)	0.25	0.75	0.75	0.75
Major Study Products				
Calcium Carbide	0.00	1.94	1.94	1.94
Sodium Sulfate	0.00	0.00	0.00	0.00
Titanium Dioxide				
(Sulfate)				
[Neutralization]	1.90	10.05	83.57	98.09
[Acid Recovery]	1.69	10.05	35.71	50.48
(Chloride)	2.12	38.61	38.61	66.79
Sodium Chromate and Bichromate	0.26	11.66	16.45	16.45
Potassium Bichromate	0.57	3.52	5.24	5.24
Additional Products				
Sodium Bicarbonate	0.03	0.04	0.04	0.04
Solar Salt	2.34	2.34	2.34	2.34
Evaporated Salt	0.00	0.23	0.44	0.44
Sodium Silicate	0.19	0.60	1.14	1.14
Sodium Metal	0.19	3.07	5.53	5.53
Sodium Sulfite	0.00	3.09	2.98	(1.56)*
Calcium Chloride	0.00	0.19	0.19	0.19
Soda Ash--Synthetic	0.44	(1.17)*	0.44	1.10
Potassium Sulfate	0.10	2.47	2.47	2.47

*Before-tax profit.

Source: Development Document on inorganic chemicals, alkali and chlorine industries prepared for United States Environmental Protection Agency under Contract Number 68-01-1513, June 1973.

TABLE 2

MANUFACTURING COSTS AND PLANT ECONOMICS

	Selling Price	Manufacturing Cost[1]	After Tax Net Income	Depreciable Investment	Sample Plant Capacity
	($/Ton)			$MM	M Tons/Year
Initial Study Products					
Aluminum Chloride	292	226	21	1.2	10
Aluminum Sulfate	42	32	3	1.0	33
Chlorine and Caustic Soda					
Mercury	101[2]	N.A.	4.12	13	66
Diaphragm	101[2]	81	4.33	20	115
Hydrofluoric Acid	370	N.A.	18	5	21
Lime	16	12	1.00	4	165
H_2SO_4					
Burning	20	14	1.20	6	330
Regeneration	22	16	1.20	9	330
Major Study Products					
Calcium Carbide	90	86	0	4	45
Titanium Dioxide--					
Sulfate	540	416	26	15	25
Chloride	570	471	21	21	25
Sodium Bichromate	245	212	18	5	49
Potassium Bichromate	475	403	24	2	5

[1] Excluding GS&A and federal income taxes.

[2] Sales revenue per ECU.

Source: Initial Study Products: "Initial Analysis of the Economic Impact of Water Pollution Control Costs Upon Ten Inorganic Chemicals," final report to Environmental Protection Agency for Booz, Allen Public Administration Services, Inc., January 5, 1973.
Major Study Products: The Contractor.

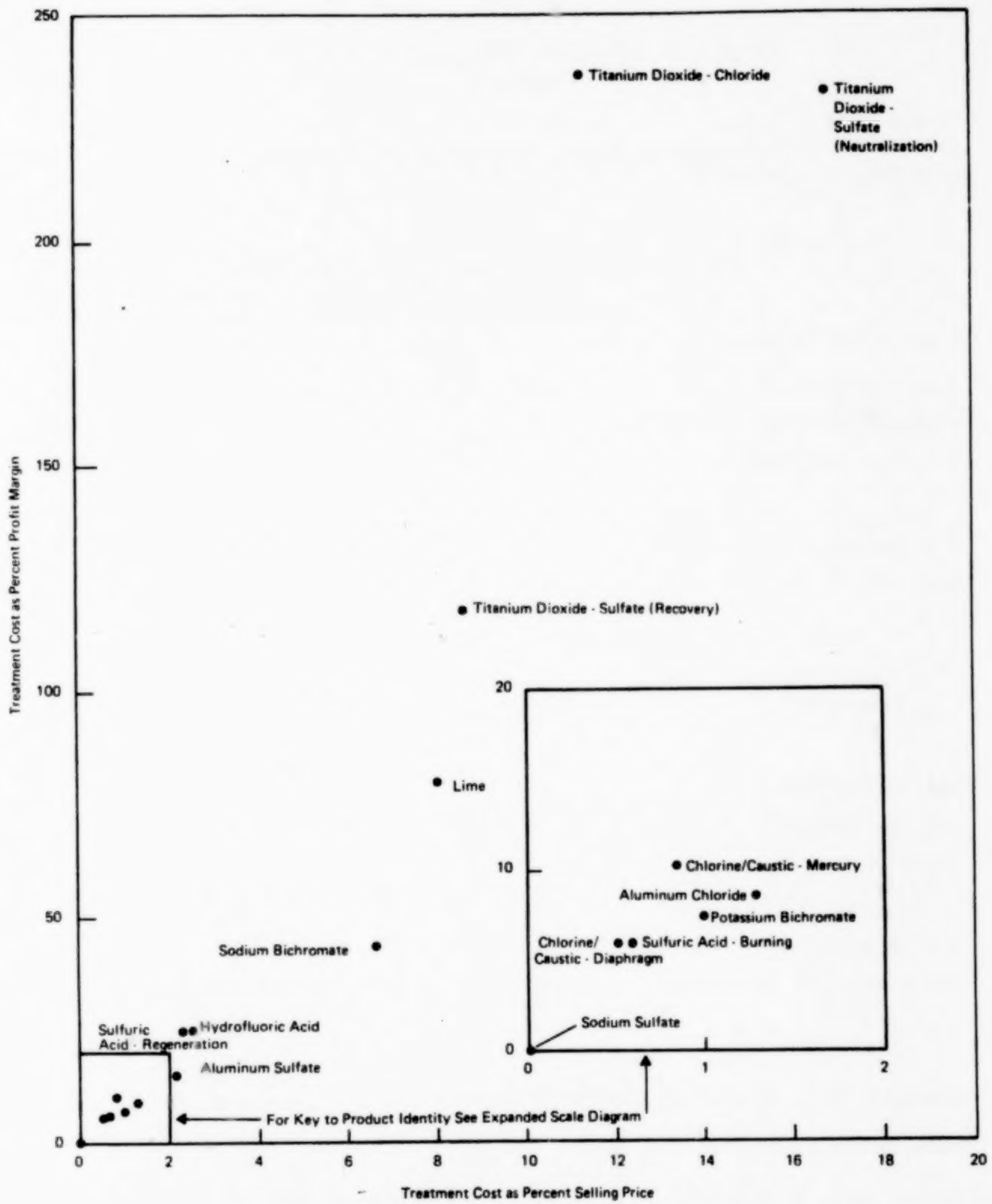

FIGURE 1 INCREMENTAL WATER TREATMENT COSTS FOR BEST AVAILABLE TECHNOLOGY VERSUS SELLING PRICE AND PROFIT MARGIN

process, the estimated treatment costs on a unit basis are very nearly 2.5 times current estimated industry profit levels.) Lime and sodium bichromate are at an intermediate level where treatment costs represent 7-8% of selling price and 50-80% of estimated profit margins. A third group of products--hydrofluoric acid, sludge sulfuric acid, and aluminum sulfate--are faced with treatment costs representing 2-3% of selling price and 15-25% of estimated profit margins. A final group of products including aluminum chloride, potassium bichromate, chlorine and caustic soda, and direct burning sulfuric acid, have estimated treatment costs at about 1% of selling price and 5-10% of profits. No water treatment costs were ascribed to sodium sulfate (as chromate by-product).

The same comparison is made in Figure 2 using incremental water treatment costs for B.P.T. In general, the spatial relationships between the identified products is much the same as in Figure 1, with the exception that sulfate process titanium dioxide is at a greater disadvantage with respect to chloride process titanium dioxide.

Although Figures 1 and 2 provide a first approximation of the impact severity on each of the products from additional water treatment costs, we have used the methodology described above to assess the economic impact. The results of this assessment are summarized in Table 3. From this table and based on the treatment costs given in the Development Document we conclude that plant shutdowns as a direct result of increased water treatment costs using B.A.T. are likely for chlorine/caustic soda, lime, sludge sulfuric acid, sulfate process titanium dioxide and sodium bichromate. Although the B.A.T. costs for potassium bichromate could be passed on through a price increase the one significant manufacturing facility could not continue operating if the sodium bichromate plant upon which it depends were shut down. For the other products included in the study the increased water treatment costs will either be passed on as price increases or absorbed by the producers.

The final effluent guidelines, published in the March 12, 1974, Federal Register contain some changes from the originally proposed guidelines. Among others, the B.A.T. standards for mercury cell chlorine/caustic and sulfate process titanium dioxide have been modified to allow higher suspended solids. The aforementioned plant shutdown conclusions are based on the guidelines and estimated treatment costs contained in the original Development Document dated June 1973.

The same shutdown conclusions pertain as well for B.P.T. For three of the five shutdown candidates--viz. lime, sludge sulfuric acid, and sodium bichromate--B.P.T. costs are identical to B.A.T. costs. It should be noted that the regulation as promulgated for B.P.T. standards for sodium bichromate has been relaxed somewhat from the originally proposed regulation. For the remaining two--viz. mercury cell chlorine/caustic and sulfate process titanium dioxide--the costs resulting from B.P.T. were not judged to be significantly different (i.e., lower) than B.A.T. costs to impact the industries less severely.

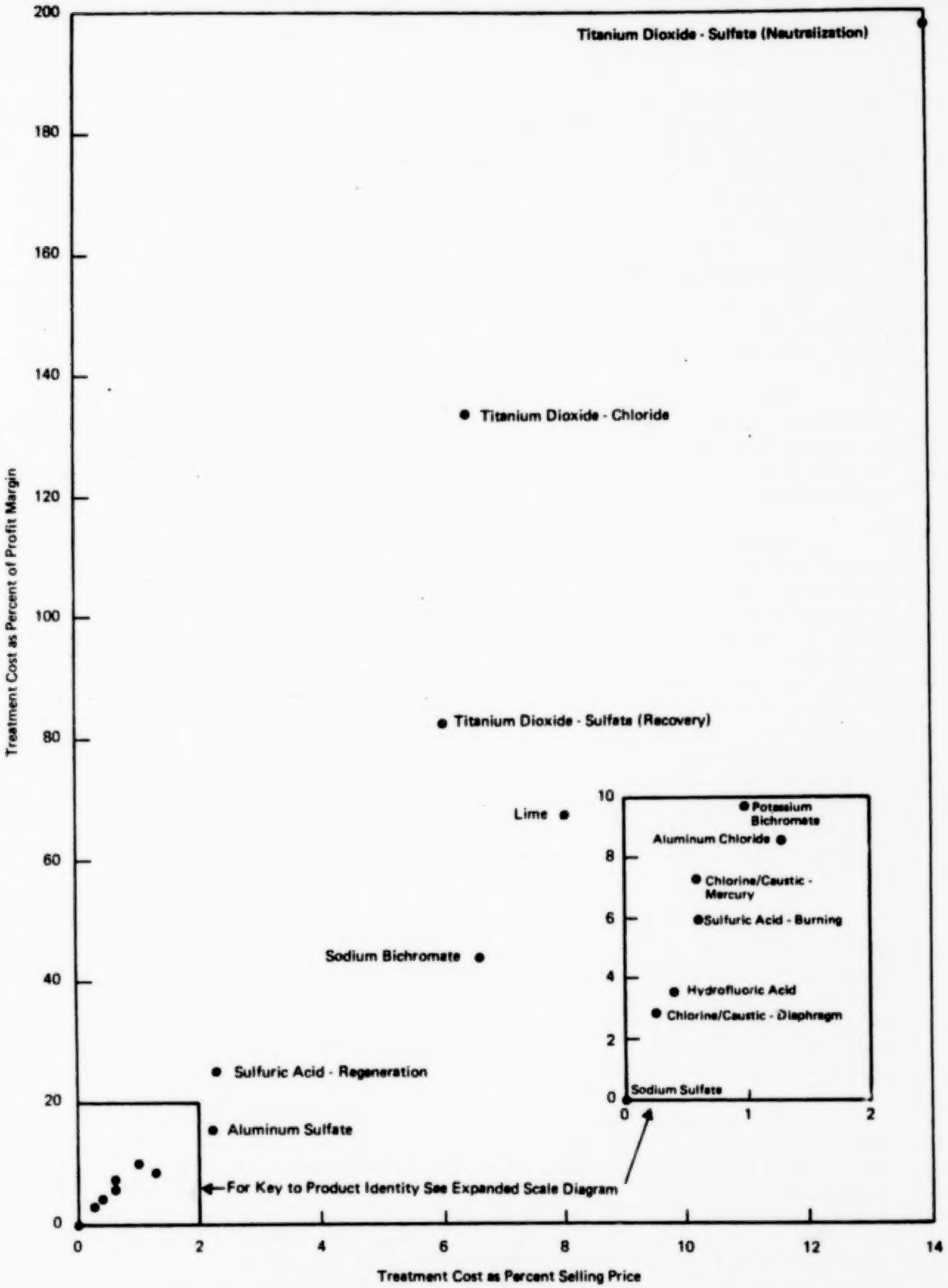

FIGURE 2 INCREMENTAL WATER TREATMENT COSTS FOR BEST PRACTICABLE TECHNOLOGY VERSUS SELLING PRICE AND PROFIT MARGIN

D. ADDITIONAL STUDY PRODUCTS

1. Water Treatment Costs

All of the water treatment costs for the various levels of effluent control shown in this report were taken from the Development Document prepared for the EPA under contract number 68-01-1513 d[illegible]d June 1973.

The water treatment costs provided by the Development Document and summarized in Table 1 were specific to a particular manufacturing process for each of the products under consideration. In general, this manufacturing process is not the only method for producing the products being considered, or in some cases not even the major method of production. Our judgment of economic imapct, however, is necessarily predicated on these costs and we have, therefore, confined our judgment to the economic impact on the producers utilizing the particular process defined by the Development Document. The processes are specified in the individual product studies.

2. Conclusions

The impact analysis matrix (Table 3) also summarizes the relevant price increase and plant shutdown impact considerations for the additional products. For none of the nine additional products do we see plant shutdowns as a direct result of increased water treatment costs. For one of the nine--sodium metal--there may be plant shutdowns as a result of possible reduced demand for alkyl leads in gasoline.

The Development Document indicates that for solar salt there would be no incremental cost for B.P.T. or B.A.T. over E.P.P. and consequently no economic impact. For sodium bicarbonate, evaporated salt, sodium silicate, and calcium shloride, the conclusion is that water treatment costs can be passed on as price increases. For sodium metal, sodium sulfite, and potassium sulfate, the water treatment costs will either be absorbed by the producer or passed on as price increases. Finally, for sodium carbonate the nominal incremental cost for B.A.T. over E.P.P. will be absorbed by the producer. (The original Development Document indicates that there is no incremental cost over E.P.P. for B.P.T. for synthetic soda ash.)

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TABLE 3
IMPACT ANALYSIS MATRIX

			ALUMINUM CHLORIDE	ALUMINUM SULFATE	CHLORINE & CAUSTIC SODA (Mercury)	CHLORINE & CAUSTIC SODA (Diaphragm)
1972 Production (M Tons) 1971 Unit Value ($/Ton) 1972 Production Value ($MM) Number of Plants (Current)			34 292 9.4 8	1,124 42.50 47.8 100	9,870 (Cl_2); 45.50 (Cl_2); 464 (Cl_2); 29**	10,710 (NaOH) 47.80 (NaOH) 525 (NaOH) 34**
PRICE INCREASE CONSTRAINTS						
Factor	Condition for Constraint	Treatment Level				
Ratio of BT* Treatment Cost to Selling Price (%)	High	E.P.P. B.P.T. B.A.T.	1.3 1.3 1.3	2.2 2.2 2.2	0.0 0.6 0.8	0.25 0.25 0.52
Substitute Products	High Occurrence		Low	Low	Low	
Capacity Utilization	Low		65%	ca. 75%	95%	
Captive Usage	Low		Low	<10%	62% (Cl_2);	33% (NaOH)
Demand Growth	Low		Static	3%/Yr	6%/Yr (Cl_2);	5% (NaOH)
Foreign Competition	High		Low	< 1%	Low	
Abatement Cost Differences	Unequal		Equal	Unequal	Unequal	
Price Elasticity of Demand	High		Low	Low	Low to Moderate	
Basis for Competition	Price		Quality, Service	Price	Price	
Market Share Distribution	Fragmented		Fragmented	Concentrated	Concentrated	
Number of Producers	Many		6	27	30	

*Before-Tax.

**Includes five combined (both mercury and diaphragm) plants.

TABLE 3 (Continued)

PLANT SHUTDOWN DECISION			ALUMINUM CHLORIDE	ALUMINUM SULFATE	CHLORINE & CAUSTIC SODA (Mercury)	CHLORINE & CAUSTIC SODA (Diaphragm)
Factor	Condition for Shutdown	Treatment Level				
Ratio of AT* Treatment Cost to AT* Net Income (%)	High	E.P.P. B.P.T. B.A.T.	8.6 8.6 8.6	15.7 15.7 15.7	0.0 7.3 10.4	2.9 2.9 6.0
Cash Flow (Including Treatment Costs)	Negative		N.A.	Positive	Positive	Positive
Ratio of Investment in Treatment Facilities to Net Fixed Investment (%)	High	E.P.P. B.P.T. B.A.T.	N.A. N.A. N.A.	10.0 10.0 10.0	0.0 1.5 1.9	0.03 0.72 2.4
Integration	Low		Moderate Forward; Low Backward	Low	High	
Chemical Complex	Isolated Plant		Isolated	Complex and Isolated	Complex	
Other Environmental Problems (Including OSHA)	Multiple		Air Pollution	Solid Waste	Nominal	
Emotional Commitment	Indifference		High	Low to Moderate	Low to High	
Ownership	Multi-Industry Companies		Predominantly Multi-Industry	Multi-Industry	Multi-Industry	

*After-Tax.

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TABLE 3 (Continued)

			HYDROCLORIC ACID	HYDROFLUORIC ACID	HYDROGEN PEROXIDE (Electrolytic)	HYDROGEN PEROXIDE (Organic)
1972 Production (M Tons) 1971 Unit Value ($/Ton) 1972 Production Value ($MM) Number of Plants (Current)			2,204 43.2 95.2 89	332.2 349.31 112.8 14	9 596 5.4 1	66 596 39.3 5
PRICE INCREASE CONSTRAINTS						
Factor	Condition for Constraint	Treatment Level				
Ratio of BT Treatment Cost to Selling Price (%)	High	E.P.P. B.P.T. B.A.T.	0.0 0.2 0.2	0.1 0.4 2.5	0.1 0.2 0.2	0.1 0.1 0.2
Substitute Products	High Occurrence		Moderate	Low	Low	
Capacity Utilization	Low		ca. 90%	84.5%	70%	
Captive Usage	Low		60%	75%	30%	
Demand Growth	Low		4%/Yr	5%-7%/Yr	Static	
Foreign Competition	High		Low	Low	Moderate	
Abatement Cost Differences	Unequal		Unequal	Equal	Unequal	
Price Elasticity of Demand	High		Moderate	Low	Low	
Basis for Competition	Price		Price	Price	Quality, Service	
Market Share Distribution	Fragmented		Fragmented	Concentrated	Concentrated	
Number of Producers	Many		42	9	6	

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TABLE 3 (Continued)

PLANT SHUTDOWN DECISION			HYDROCHLORIC ACID	HYDROFLUORIC ACID	HYDROGEN PEROXIDE (Electrolytic)	HYDROGEN PEROXIDE (Organic)
Factor	Condition for Shutdown	Treatment Level				
Ratio of AT Treatment Cost to AT Net Income (%)	High	E P.P. B.P.T. B.A.T.	N.A. N.A. N.A.	1.3 3.6 25.4	N.A. N.A. N.A.	N.A. N.A. N.A.
Cash Flow (Including Treatment Costs)	Negative		Positive	Positive	N.A.	
Ratio of Investment in Treatment Facilities to Net Fixed Investment (%)	High	E.P.P. B.P.T. B.A.T.	N.A. N.A. N.A.	0.6 1.0 1.5	N.A. N.A. N.A.	N.A. N.A. N.A.
Integration	Low		High	High Forward	Moderate Forward; Moderate Backward	
Chemical Complex	Isolated Plant		Complex	Complex	Isolated	
Other Environmental Problems (Including OSHA)	Multiple		Air	Nominal	None	
Emotional Commitment	Indifference		High	High	High	
Ownership	Multi-Industry Companies		Multi-Industry	Multi-Industry	Multi-Industry	

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TABLE 3 (Continued)

			LIME	NITRIC ACID	SULFURIC ACID (Burning)	SULFURIC ACID (Regen)
1972 Production (M Tons)			20,865	7,000	31,086	
1971 Unit Value ($/Ton)			16	67	21	
1972 Production Value ($MM)			334	441	652.8	
Number of Plants (Current)			170	80	142 Total;	33 Regen
PRICE INCREASE CONSTRAINTS						
Factor	Condition for Constraint	Treatment Level				
Ratio of BT Treatment Cost to Selling Price (%)	High	E.P.P. B.P.T. B.A.T.	8.0 8.0 8.0	N.A. N.A. 0.3	0.2 0.6 0.6	2.3 2.3 2.3
Substitute Products	High Occurrence		Low	Moderate	Moderate	
Capacity Utilization	Low		ca. 95%	85%	65-70% (Fertilizer) 95% (Merchant)	
Captive Usage	Low		35%	90%	60%	
Demand Growth	Low		Moderate	Low	3-4% (Fertilizer) 2-3% (Merchant)	
Foreign Competition	High		Low	Low	Low	
Abatement Cost Differences	Unequal		Unequal	Equal	Unequal	
Price Elasticity of Demand	High		Moderately High	Moderate	Moderate	
Basis for Competition	Price		Price	Price	Price	
Market Share Distribution	Fragmented		Fragmented	Fragmented	Concentrated (Fertilizer) Fragmented (Merchant)	
Number of Producers	Many		110	49	71	

TABLE 3 (Continued)

			LIME	NITRIC ACID	SULFURIC ACID (Burning)	SULFURIC ACID (Regen)
PLANT SHUTDOWN DECISION						
Factor	Condition for Shutdown	Treatment Level				
Ratio of AT Treatment Cost to AT Net Income (%)	High	E.P.P. B.P.T. B.A.T.	67.0 67.0 67.0	N.A. N.A. N.A.	2.5 6.0 6.0	25 25 25
Cash Flow (Including Treatment Costs)	Negative		ca. $2/Ton Depr.	N.A.	Positive	Positive
Ratio of Investment in Treatment Facilities to Net Fixed Investment (%)	High	E.P.P. B.P.T. B.A.T.	N.A. N.A. N.A.	N.A. N.A. N.A.	1.4 3.0 3.0	14.4 14.4 14.4
Integration	Low		Moderate Forward; High Backward	High Forward; Low Backward	Moderate to High	
Chemical Complex	Isolated Plant		Complex and Isolated	Complex	Complex	
Other Environmental Problems (Including OSHA)	Multiple		Air	Air Pollution	Air Pollution	
Emotional Commitment	Indifference		High	Moderate	High	
Ownership	Multi-Industry Companies		Two-thirds are Multi-Industry	Large Multi-Industry; Small Fertilizer and Explosive	Multi-Industry	

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TABLE 3 (Continued)

	CALCIUM CARBIDE	SODIUM SULFATE	TITANIUM DIOXIDE (Sulfate)	TITANIUM DIOXIDE (Chloride)
1972 Production (M Tons)	493	1,364	687	
1971 Unit Value ($/Ton)	90	21	452	
1972 Production Value ($MM)	44.4	28.6	343	
Number of Plants (Current)	5	32	6	8

PRICE INCREASE CONSTRAINTS							
Factor	Condition for Constraint	Treatment Level	CALCIUM CARBIDE	SODIUM SULFATE	TITANIUM DIOXIDE (Sulfate) Neut.	TITANIUM DIOXIDE (Sulfate) Acid Rec.	TITANIUM DIOXIDE (Chloride)
Ratio of BT Treatment Cost to Selling Price (%)	High	E.P.P. B.P.T. B.A.T.	2.2 2.2 2.2	0.0 0.0 0.0	1.4 14.3 16.8	1.5 6.0 8.6	6.4 6.4 11.3
Substitute Products	High Occurrence		High	High	Low		
Capacity Utilization	Low		59%	88%	[illegible]		
Captive Usage	Low		7[illegible]	Low	[illegible]		
Demand Growth	Low		Declining	Static	[illegible]		
Foreign Competition	High		Low	Moderate to High	Low		
Abatement Cost Differences	Unequal		Unequal	Unequal	Unequal		
Price Elasticity of Demand	High		Moderately High	High	Low		
Basis for Competition	Price		Price	Price	Technology and Service		
Market Share Distribution	Fragmented		Concentrated	Fragmented	Concentrated		
Number of Producers	Many		4	22	4		7

TABLE 3 (Continued)

PLANT SHUTDOWN DECISION							
Factor	Condition for Shutdown	Treatment Level	CALCIUM CARBIDE	SODIUM SULFATE	TITANIUM DIOXIDE (Sulfate) Neut.	TITANIUM DIOXIDE (Sulfate) Acid Rec.	TITANIUM DIOXIDE (Chloride)
Ratio of AT Treatment Cost to AT Net Income (%)	High	E.P.P. B.P.T. B.A.T.	0.0 0.0 0.0	0.0	19.7 198.0 233.0	20.3 82.5 118.0	134 134 237
Cash Flow (Including Treatment Costs)	Negative		N.A.	N.A.	Positive		
Ratio of Investment in Treatment Facilities to Net Fixed Investment (%)	High	E.P.P. B.P.T. B.A.T.	N.A. N.A. N.A.	0.0 0.0 0.0	0.2 48.3 55.6	0.2 19.0 26.3	17.3 17.3 23.5
Integration	Low		Moderate Forward; High Backward	High	Low to Moderate Forward; Moderate Backward		Low to Moderate Forward; Low to Moderate Backward
Chemical Complex	Isolated Plant		Complex and Isolated	Complex	Isolated		
Other Environmental Problems (Including OSHA)	Multiple		Air Pollution	Some Air Pollution	Solid Waste Air (Chloride)		
Emotional Commitment	Indifference		Acetylene Low; Others High	By-product Low; Others High	High		
Ownership	Multi-Industry Companies		Primarily Multi-Industry	Multi-Industry	Multi-Industry		

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TABLE 3 (Continued)

Factor	Condition for Constraint	Treatment Level	SODIUM CHROMATE AND BICHROMATE	POTASSIUM BICHROMATE	SODIUM BICARBONATE	SOLAR SALT
1972 Production (M Tons)			137.1	3	248	1,799*
1971 Unit Value ($/Ton)			248	475	49	8.40**
1972 Production Value ($MM)			34.9	1.4	12.1	15.1***
Number of Plants (Current)			3	1	4	18
PRICE INCREASE CONSTRAINTS						
Ratio of BT Treatment Cost to Selling Price (%)	High	E.P.P. B.P.T. B.A.T.	4.6 6.6 6.6	0.6 1.0 1.0	0.02 0.02 0.02	0.00 0.00 0.00
Substitute Products	High Occurrence		Many (for derivatives)	Moderate	Low	High
Capacity Utilization	Low		80%	N.A.	94%	High
Captive Usage	Low		35%	Low	Low	Low
Demand Growth	Low		Declining	Low	4½-6%	Static
Foreign Competition	High		High	Moderate	Low	High
Abatement Cost Differences	Unequal		Unequal	---	Equal	None
Price Elasticity of Demand	High		High	High	Low	High
Basis for Competition	Price		Price and Service	Price	Price	Price
Market Share Distribution	Fragmented		Concentrated	Concentrated	Concentrated	Fragmented
Number of Producers	Many		3	1	3	11

*Quantity sold or used by producers.
**Reported 1972 value.
***Value of quantity sold or used by producers.

TABLE 3 (Continued)

Factor	Condition for Shutdown	Treatment Level	SODIUM CHROMATE AND BICHROMATE	POTASSIUM BICHROMATE	SODIUM BICARBONATE	SOLAR SALT
PLANT SHUTDOWN DECISION						
Ratio of AT Treatment Cost to AT Net Income (%)	High	E.P.P. B.P.T. B.A.T.	30.8 43.7 43.7	6.2 9.7 9.7	0.2 0.2 0.2	0.0 0.0 0.0
Cash Flow (Including Treatment Costs)	Negative		Positive	Positive	Positive	Unchanged
Ratio of Investment in Treatment Facilities to Net Fixed Investment (%)	High	E.P.P. B.P.T. B.A.T.	15.8 29.8 29.8	0.5 1.0 1.0	Low Low Low	0.0 0.0 0.0
Integration	Low		Low to Moderate	High Backward; Low Forward	Low	Low
Chemical Complex	Isolated Plant		Isolated	Isolated	Complex	Isolated
Other Environmental Problems (Including OSHA)	Multiple		Multiple	Multiple	Nominal	Multiple
Emotional Commitment	Indifference		High	High	Low to High	Indifference
Ownership	Multi-Industry Companies		Multi-Industry	Multi-Industry	Predominately Multi-Industry	Single-Industry

TABLE 3 (Continued)

			EVAPORATED SALT	SODIUM SILICATE	SODIUM METAL	SODIUM SULFITE
1972 Production (M Tons)			4,051*	663	159.9	460
1971 Unit Value ($/Ton)			26.94**	86	220	48 Avg./$200 Photo
1972 Production Value ($MM)			109.1	57	33.28	22
Number of Plants (Current)			23	42	5	7***
PRICE INCREASE CONSTRAINTS						
Factor	Condition for Constraint	Treatment Level				
Ratio of BT Treatment Cost to Selling Price (%)	High	E.P.P. B.P.T. B.A.T.	0.87 1.6 1.6	0.5 1.0 1.0	1.0 2.0 2.0	6 Avg./1.5 Photo Grade 6 Avg./1.5 Photo Grade -3 Avg/-.8 Photo Grade****
Substitute Products	High Occurrence		Low	Low	Medium	High General; Low Photo Grade
Capacity Utilization	Low		Low	70% (Low)	85% (High)	90%
Captive Usage	Low		Low	25% (Low)	85% (High)	Low
Demand Growth	Low		2.5% Par Year	Low	Low	Low
Foreign Competition	High		Low	Negligible	Low	Low
Abatement Cost Differences	Unequal		Equal	Equal	Unequal	N.A.
Price Elasticity of Demand	High		Low	Low	Low	Low
Basis for Competition	Price		Price/Service	Price	Price	Price
Market Share Distribution	Fragmented		Fragmented	Fragmented (6 producers control 90%)	Concentrated	Fragmented
Number of Producers	Many		12	10	3	5

*Quantity sold or used by producers.
**Reported 1972 value.

***Plants producing merchant material as by-product and primary product (3 plants primary product--photo grade)--excludes plants producing for captive consumption in NSSC pulp.
****Applicable only to product which is manufactured for merchant market by direct reaction of SO_2 and Na_2CO_3 with subsequent crystallization to obtain dry material.

TABLE 3 (Continued)

PLANT SHUTDOWN DECISION			EVAPORATED SALT	SODIUM SILICATE	SODIUM METAL	SODIUM SULFITE
Factor	Condition for Shutdown	Treatment Level				
Ratio of AT Treatment Cost to AT Net Income (%)	High	E.P.P. B.P.T. B.A.T.	7.3 13.7 13.7	10 20 20	10 25 25	Low Lower Lowest (Negative)
Cash Flow (Including Treatment Costs)	Negative		Positive	Positive	Negative	Negative
Ratio of Investment in Treatment Facilities to Net Fixed Investment (%)	High	E.P.P. B.P.T. B.A.T.	16.9 33.8 33.8	1 2 2	5 5 5	N.A. N.A. N.A.
Integration	Low		Low	Low	High	80% By-product*
Chemical Complex	Isolated Plant		Isolated	Isolated	Isolated	80% By-product*
Other Environmental Problems (Including OSHA)	Multiple		Nominal	N.A.	N.A.	Multiple
Emotional Commitment	Indifference		High	Low	Low-High	Indifference
Ownership	Multi-Industry Companies		Single-Industry	Multi-Industry	Multi-Industry	Multi-Industry

*Estimated 80% of merchant sales are of sodium sulfite obtained as by-product of phenol or resorcinol production.

TABLE 3 (Continued)

Factor	Condition for Constraint	Treatment Level	CALCIUM CHLORIDE	SYNTHETIC SODA ASH	POTASSIUM SULFATE	
1972 Production (M Tons)			820	4,301	402	
1971 Unit Value ($/Ton)			39	34.60*	42.27	
1972 Production Value ($MM)			32	148.8	16	
Number of Plants (Current)			11	6	6 + Minors	
PRICE INCREASE CONSTRAINTS						
Ratio of BT Treatment Cost to Selling Price (%)	High	E.P.P. B.P.T. B.A.T.	0.5 0.5 0.5	3.4% Profit 0 1.9	5.2 5.2 5.2	
Substitute Products	High Occurrence		Low	High	Moderate	
Capacity Utilization	Low		90%	95%	76% (Nominal 1972)	
Captive Usage	Low		Low	25%	Low	
Demand Growth	Low		Low	Declining	Low	
Foreign Competition	High		Low	Low	Moderate	
Abatement Cost Differences	Unequal		N.A.	Unequal**	Unequal***	
Price Elasticity of Demand	High		Low	High	Low	
Basis for Competition	Price		Price	Price	Price	
Market Share Distribution	Fragmented		Concentrated	Concentrated	Concentrated	
Number of Producers	Many		10	5	5 Plus Minors	

*Reported 1972 value.
**Unequal in comparison with effluent treatment costs for natural soda ash.
***Between production processes--i.e., Hargreaves, Mannheim, Langbeinite, etc.

TABLE 3 (Continued)

Factor	Condition for Shutdown	Treatment Level	CALCIUM CHLORIDE	SYNTHETIC SODA ASH	POTASSIUM SULFATE	
PLANT SHUTDOWN DECISION						
Ratio of AT Treatment Cost to AT Net Income (%)	High	E.P.P. B.P.T. B.A.T.	Low Low Low	77% Profit 0 43.8	16 16 16	
Cash Flow (Including Treatment Costs)	Negative		Positive	Positive	Positive	
Ratio of Investment in Treatment Facilities to Net Fixed Investment (%)	High	E.P.P. B.P.T. B.A.T.	2.5 2.5 2.5	245 0.0 13.7	8 8 8	
Integration	Low		By-product	Moderate Forward; Low Backward	High	
Chemical Complex	Isolated Plant		By-product	Complex	Isolated	
Other Environmental Problems (Including OSHA)	Multiple		N.A.	Nominal	N.A.	
Emotional Commitment	Indifference		Moderate	Medium	Low	
Ownership	Multi-Industry Companies		Multi-Industry	Multi-Industry	Multi-Industry	

II. INDUSTRY CHARACTERIZATION--MAJOR STUDY PRODUCTS

A. CALCIUM CARBIDE

1. Summary

Calcium carbide is produced in the United States almost exclusively for conversion to acetylene gas. Acetylene is used primarily in the synthesis of various organic chemicals and plastics, although a significant amount is used as a fuel for welding and other metalwork.

Production of calcium carbide declined more than 50% by 1972 from a peak reached in the mid-1960's. The main reason for this decline has been the substitution of acetylene derived from hydrocarbons for that produced from calcium carbide for the manufacture of organic chemicals. Acetylene for chemical uses has also been largely replaced by other, less expensive, raw materials.

While the lower cost of shipping calcium carbide to industrial centers for conversion to fuel acetylene has favored this source over tanked, hydrocarbon-derived acetylene, more convenient and economical fuels (e.g., propane) have made significant inroads into the amount of acetylene used for metalworking.

The general trend of a declining market for calcium carbide is likely to continue as hydrocarbon-derived acetylene replaces carbide-derived acetylene for chemical use, and as other raw materials replace acetylene in both chemical and metalworking applications.

2. Market Characterization

a. Size

U.S. production of calcium carbide reached a maximum of approximately 1.1 million tons per year in the period 1960 to 1965. Since U.S. foreign trade in this commodity has always been small in comparison to production, apparent annual consumption of calcium carbide was also at a level of about 1.1 million tons during this period, as is shown in Table 4. By 1972, production had fallen to less than half a million tons per year. Table 4 also indicates the low level of imports, which have ranged between 1% and 3% of consumption in recent years, and have come exclusively from Canada.

b. Growth

Calcium carbide producers have experienced a steady drop in demand for almost a decade. Annual market value data for calcium carbide production since 1950 are given in Table 5. While 1972 production, at

TABLE 4

CALCIUM CARBIDE PRODUCTION, IMPORT/EXPORT, AND APPARENT CONSUMPTION
(Thousands of Tons)

Year	Production	Imports	Exports[1]	Apparent Consumption[2]
1950	671	6	6	671
1955	875	2	4	873
1960	1,093	5	5	1,093
1961	1,042	5	6	1,041
1962	1,083	6	6	1,083
1963	1,109	7	6	1,110
1964	1,132	12	6	1,138
1965	1,098	11	-	1,109
1966	1,063	20	-	1,083
1967	912	8	-	920
1968	942	7	-	949
1969	856	18	-	874
1970	791	19	-	810
1971	625	20	-	645
1972	493	11	-	504

[1]Exports not reported separately after 1964.

[2]Apparent consumption: production and imports minus exports.

Source: U.S. Department of Commerce.

TABLE 5

TOTAL MARKET VALUE OF CALCIUM CARBIDE PRODUCTION

Year	Production (Thousands of Tons)	Market Value ($/Ton)	Total Market Value ($MM)
1950	671	78	52.3
1955	875	94	82.3
1960	1,093	100	109.3
1961	1,042	99	103.5
1962	1,083	93	101.0
1963	1,109	95	104.9
1964	1,132	91	102.8
1965	1,098	89	97.7
1966	1,063	87	92.5
1967	912	94	85.7
1968	942	94	88.5
1969	856	78	66.8
1970	791	81	64.1
1971	625	90	56.3
1972	493	90 (est.)	44.4

Sources: U.S. Department of Commerce, and Contractor's estimates.

493,000 tons represented a 55% drop from 1960 production levels, price erosion has caused the total market value of calcium carbide production to drop 60% over the same period (from $109 million to $44 million).

c. Uses

Although a small quantity of calcium carbide is consumed in such direct applications as the carburization of steel, desulfurization, and other foundry work, by far the largest use is in the production of acetylene. In the preferred "dry" process, water is added to calcium carbide to form acetylene and calcium hydroxide at the rate of 640 pounds of acetylene per ton of carbide. The "wet" process uses excess water, and produces by-product calcium hydroxide in a slurry which is 90% water.

Approximately 80% of the acetylene produced from calcium carbide is used as a raw material in the synthesis of organic chemicals and plastics by the chemical industry. The balance is used as a fuel in metalworking for welding, cutting, and scarfing. A summary of calcium carbide use, showing representative products produced by the chemical industry, is given in Table 6.

d. Substitute Products

Until 1951, all of the acetylene produced in the United States was derived from calcium carbide. Since that time, acetylene has also been manufactured through the pyrolysis, or cracking, of hydrocarbons. This process produces several other important industrial chemicals as by-products, and has become increasingly competitive with the calcium carbide route to acetylene.

The advantage of calcium carbide as a source of acetylene is that the carbide can be shipped more economically than the heavy cylinders of compressed acetylene gas. Thus, for uses which are geographically removed from the production of hydrocarbon-derived acetylene, calcium carbide as a source of acetylene is less-susceptible to substitution. Even here, however, carbide acetylene faces competition from other fuels, such as propane or natural gas, and also from electric-arc welding.

In such direct applications as the carburization of steel, desulfurization, and use as a drying agent, calcium carbide also faces competition from a variety of products. In foundry work, various combinations of lime, coke, and magnesium can replace calcium carbide. Calcium sulfate is only one example among a variety of alternative drying agents which are available as substitutes for calcium carbide. These direct applications currently account for only about 3% of U.S. consumption.

e. Geographic Consumption

Except for the relatively small amount of calcium carbide used to generate acetylene for metalworking, virtually all calcium carbide

TABLE 6

USE PATTERN OF CALCIUM CARBIDE BY APPLICATION[1]

Calcium Carbide Converted to Acetylene		97%
Chemical Acetylene	80%	
Used in synthesis of organic chemicals (e.g., butadiene, allyl alcohol, vinyl ethers) and derived products such as neoprene, other plastics, and resins.		
Fuel Acetylene	17%	
Used for welding, cutting and scarfing in metalwork, and for production of acetylene black.		
Calcium Carbide for Direct Use		3%
Includes use as a dehydrating agent and a reducing and desulfurizing agent in certain metallurgical processes.		
		100%

[1]This use pattern is typical of consumption in 1972. Chemical use of calcium carbide acetylene is rapidly becoming much less significant.

Sources: Kirk-Othmer, Encyclopedia of Chemical Technology; Shreve, Chemical Process Industries; and Contractor's estimates.

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is consumed in the region in which it is produced. In fact, most carbide acetylene is generated either in the same plant as the carbide, or in an adjacent one. In 1972, nearly 85% of U.S. calcium carbide production capacity was located in Kentucky and Ohio, and with it, the bulk of calcium carbide consumption. Most of the remaining 15% of consumption occurs in major industrial metalworking cities such as Cleveland, Detroit, and Pittsburgh.

f. Captive Requirements

As indicated above, calcium carbide is most often used as a ready source of acetylene. Furthermore, the greatest portion of calcium carbide is consumed either in the same plant as it is produced, or at another plant owned by the same company. Although the most recent information on merchant shipments was given in 1965, it is apparent from these data that captive consumption was typically at a level of 75%. Data illustrating this relationship for the years 1962 through 1965 are given in Table 7. Although the trend in recent years has been away from captive use, as acetylene for chemical synthesis has been replaced by ethylene, propylene, and other less expensive raw materials, the bulk of calcium carbide production will be consumed captively throughout the 1970's.

3. Supply Characterization

a. Manufacturing Route

Calcium carbide is prepared from quicklime (calcium oxide) and coke (carbon) which are mixed together at approximately 2000° C. This temperature is achieved in an electric furnace using large amounts of electric power. In a typical run, 1900 pounds of quicklime, 1300 pounds of coke, and 3,000 kilowatt hours of electricity are required to produce one ton of calcium carbide. The product, tapped from the furnace as a liquid, is allowed to solidify and is then crushed to a convenient size for packing and handling. Calcium carbide for chemical acetylene often goes directly to an acetylene generator in the same plant.

An example of the overall process is shown in Figure 3 as a simplified schematic diagram. The source of quicklime is a high-grade limestone containing nearly 100% calcium carbonate. The limestone is heated in a kiln to produce quicklime, which is combined with coke, or another source of carbon such as anthracite, in the electric furnace. The large power requirements and high raw material shipping costs are important factors in determining plant location.

b. Producers

In 1972, calcium carbide was produced in seven plants by four different companies. As indicated in Table 8, three of these plants

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TABLE 7

CAPTIVE VS. COMMERCIAL CONSUMPTION OF CALCIUM CARBIDE
(Thousands of Tons)

Year	Production	Consumption: Captive	Consumption: Merchant[1]	Percent Captive
1962	1,083	815	268	75
1963	1,109	824	285	74
1964	1,132	891	241	79
1965	1,098	819	279	75

[1] Last reported separately in 1965.

Source: U.S. Department of Commerce.

FIGURE 3

SCHEMATIC FLOW DIAGRAM--PRODUCTION OF CALCIUM CARBIDE

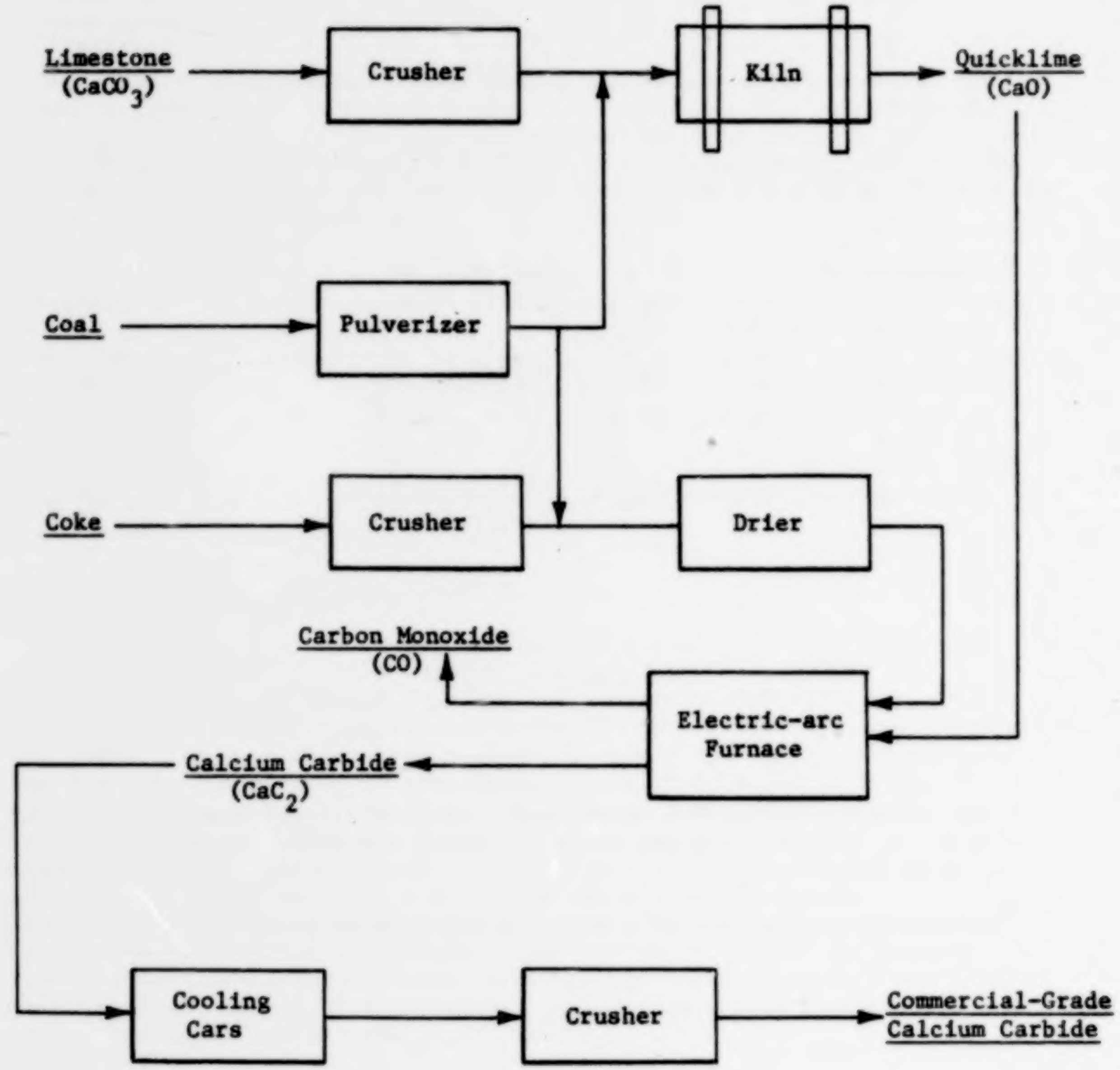

TABLE 8

CALCIUM CARBIDE PRODUCERS--LOCATION AND CAPACITY
(Thousands of Tons)

Producer	Location	Annual Capacity
Airco, Inc.	Calvert City, Ky.	325
Airco Carbide Div.[1]	Louisville, Ky.	150
Midwest Carbide Corp.	Keokuk, Iowa	30
	Pryor, Okla.	50
Pacific Carbide & Alloys Co.	Portland, Ore.	20
Union Carbide Corp.[2]		
Chemicals & Plastics Div.	Ashtabula, Ohio	228
	Portland, Ore.	35
Total		838

[1]Manufacturing operations in Calvert City were discontinued early in 1973; the Louisville plant is to be phased out over the next several years.

[2]Operations at Portland were discontinued in mid-1973.

Sources: Trade journals, industry contacts.

were responsible for most (84%) of the 1972 annual production capacity of 838,000 tons. These were the Airco plants at Calvert City and Louisville, Kentucky, and the Union Carbide plant at Ashtabula, Ohio.

A decade ago, in 1960, there were twelve plants, with a combined capacity of 1,225,000 tons. The move to reduce capacity, which began in the early 1960's, has continued into 1973 with the announcement by Airco that operations would be discontinued at the Calvert City plant, and that the Louisville plant would be phased out by about 1980. The closing of Calvert City has reduced 1973 U.S. capacity by 39% to approximately 513,000 tons per year.

Existing calcium carbide plants may be classified as either large (annual capacity 150,000 tons or more), or small (annual capacity 50,000 tons or less), with four of the six plants operating in early 1973 classified as small. All of these plants are at least ten years old and some are much older. Airco's Calvert City plant had been operating about 20 years when it closed this year.

As stated earlier, approximately 75% of all calcium carbide produced is captively consumed. This gives some indication of the large degree of intra- and inter-company integration in the sale and use of this chemical commodity. As an example, the Airco plant at Calvert City, which was the largest calcium carbide plant in the world, shipped a small part of its output to the Airco plant in Louisville, and converted the rest to acetylene for local use. This local use included chemical synthesis at an adjacent Airco plant, and shipment of acetylene and derived products by pipeline to the plants of several other firms in the large Calvert City chemical complex.

c. Manufacturing Economics

A summary of estimated manufacturing costs for calcium carbide is given in Table 9. The data in this table are for a plant of 45,000 ton-per-year annual capacity, operating at 100% capacity. A plant of double this capacity would benefit from relatively small economics of scale, reducing manufacturing costs by about 5%, to $81 per ton. On the other hand, a plant producing calcium carbide for fuel acetylene, as opposed to chemical acetylene, experiences manufacturing costs which may be from 5% to 6% higher than that shown in Table 9 due to quality requirements relating both to raw materials and to the manufacturing process itself. General, selling, and administrative expenses are estimated to be 5% of manufacturing costs. This brings total costs to about $90 per ton for a 45,000 ton-per-year plant producing calcium carbide for conversion to chemical acetylene. Depending on plant size and intended end use of the product, total manufacturers' costs may vary from approximately $85 to $95 per ton.

TABLE 9

ESTIMATED COST OF MANUFACTURING CALCIUM CARBIDE

Plant Capacity: 45,000 Tons/Yr (1-15,000 KVA furnace)
Fixed Investment: $3,740,000

	Quantity/Ton	$/Unit	$/Ton
Variable Costs			
Quicklime	0.95 ton	18.75	17.81
Coke	0.65 ton	24.00	15.60
Carbon Electrodes	30 lb.	0.15	4.50
Operating Supplies			0.30
Power	2780 kwh	0.007	19.46
Water	32 M gal	0.02	0.64
			58.31
Semi-Variable & Fixed Costs			
Operating Labor	9 men/shift	4.25/hr	7.45
Supervision	4 foremen	12,000/yr	1.07
	1 superintendent	17,000/yr	0.38
Maintenance	4½% of investment/yr		3.73
Labor Overhead	30% of operating labor and supervision		2.67
Plant Overhead	70% of operating labor and supervision		6.23
Depreciation[1]	6-2/3% of investment/yr		5.53
Local Taxes & Insurance	1½% of investment/yr		1.25
			28.31
Cost of Manufacture (Bulk)			86.62
Off Gas Credit[2]	3.14 MM Btu	0.35	(1.10)
Net Cost of Manufacture[3] (Bulk)			85.52

[1]For older plants depreciation may only cover items replaced and be about 20% of this amount.

[2]Credit valid only if carbon monoxide can be utilized as fuel at plant.

[3]Quality requirements make manufacturing costs about $5/ton higher for manufacturers of calcium carbide for use in generation of fuel acetylene.

4. Supply/Demand Balance

Industry capacity for calcium carbide has gradually been reduced since the early 1960's. As of 1972, capacity had been reduced by 30%, while production had fallen by more than 50%. In the early 1960's, operating rates were typically close to 90% of capacity; in the early 1970's operating rates have generally been below 80%, and it is only the shut down of the largest plant in the industry (Calvert City) which has brought current capacity down to a level consistent with current demand.

In view of the continued replacement of carbide acetylene by hydrocarbon-derived acetylene, and replacement of acetylene for chemical use by less expensive raw materials, this trend towards reduction of excess capacity is likely to continue as demand is further reduced. Total production in the first two months of 1973, for example, was 20% below that of the same period in 1972.

5. Prices

Published prices for packaged and delivered calcium carbide have increased steadily from $121 per ton in the early 1950's, to a level of $171 per ton since 1963. A more realistic price for 1972 is the $100 per ton, f.o.b. plant, quoted by industry sources. Some discounting occurs, and the average actual price received for calcium carbide shipments has been somewhat lower than this in recent years, as is shown in Table 10. In addition to discounting, and as indicated in the footnote for Table 10, the difference between actual and published prices also reflects packaging and freight charges. Packaging charges range from $35 to $45 per ton, and freight charges add approximately $10 per ton locally and up to $20 per ton for more distant shipments within a given region.

Information on 1972 actual prices is not yet available, but it appears that the declining trend was at least temporarily halted in 1971 when actual price increased approximately 10%, from $81.00 to $90.00 per ton. In any case, a comparison of manufacturer's total costs with actual prices received per ton of calcium carbide, indicates that U.S. producers of this chemical are currently operating at, or near, the break-even level.

TABLE 10

CALCIUM CARBIDE PRICES--PUBLISHED VS. ACTUAL
(Dollars per Ton)

Year	Published Price[1]	Actual Price[2]
1950	121	78
1955	134	94
1960	149	100
1965	171	89
1970	171	81
1971	171	90
1972	171	N.A.

[1]Published prices include packaging and freight charges of ca. $50/ton. Quoted 1972 price for bulk calcium carbide was $100 per ton, f.o.b. plant.

[2]Actual Price: Total Value of Shipments/Tons Shipped.

Sources: Chemical Marketing Reporter, U.S. Department of Commerce, and Contractor's estimates.

B. SODIUM SULFATE

1. Summary

Sodium sulfate is produced in the United States largely as a joint product with some other material, rather than for its own value. This joint-product characteristic, combined with a low price, has often led to a situation where the potential supply of sodium sulfate has exceeded demand. Uses have been developed to take advantage of the large, inexpensive supplies. As a result sodium sulfate has become an important material to several industries, and its low cost ultimately translates to lower product costs in those industries where it is used.

Sodium sulfate is used in the paper industry, by detergent manufacturers, and in the manufacture of glass and textiles. U.S. consumption has averaged 1.6 million tons over the last decade, and this level of use is likely to be characteristic of the foreseeable future.

2. Market Characterization

a. Size

U.S. production of sodium sulfate was approximately 1.36 million tons in 1972, down 8% from a record level of nearly 1.5 million tons in 1968. Total value of 1971 shipments was $28 million.

Net imports of about 0.27 million tons in 1972 (equal to 20% of U.S. production) brought total 1972 U.S. apparent consumption to approximately 1.63 million tons. Belgium accounted for 48% of import dollar value, Canada 38%, and in descending order of importance, The Netherlands, East Germany, Sweden, West Germany, and Japan accounted for the remaining 14%.

Historical data for production, foreign trade, and apparent consumption are given in Table 11. In this table, and in Table 17. (giving price information) the data are presented for both high purity (anhydrous sodium sulfate), and lower purity (saltcake) grades of sodium sulfate. Most of this analysis will be in terms of aggregate data for both grades.

b. Growth

As Table 11 illustrates, both U.S. production and apparent consumption of sodium sulfate reached record levels in 1968. Between 1968 and 1972, production decreased 8% and apparent consumption

TABLE 11

SODIUM SULFATE PRODUCTION, IMPORT/EXPORT, AND APPARENT CONSUMPTION

(Thousands of Tons--100% Na_2SO_4)

Year	Production, by Type[1] Saltcake	Anhydrous Na_2SO_4	Foreign Trade[2] Imports	Exports	Apparent Consumption[3]
1960	810	303	167	31	1249
1961	844	327	196	32	1335
1962	826	368	188	51	1331
1963	837	396	160	45	1348
1964	926	390	290	44	1562
1965	976	428	274	13	1665
1966	1,009	436	237	28	1654
1967	696	668	290	28	1626
1968	758	725	305	56	1732
1969	730	744	286	91	1669
1970	561	812	269	55	1587
1971	514	843	269	67	1559
1972	681	683	299	29	1634

1 The large difference between pre-1967 and post-1966 production figures is due to a product classification change.

2 Total for crude and refined sodium sulfate.

3 Apparent Consumption: production plus imports minus exports.

Source: U.S. Department of Commerce. Data for 1972 are preliminary.

decreased 6%. Data for 1972 indicate that the downward trend has at least temporarily stopped. Production volume was up slightly (less than 1%) from 1971, and apparent consumption increased 5%.

While net imports were at a record level in 1972, and accounted for most of the 5% increase in apparent consumption between 1971 and 1972, it is difficult to discern a trend in imports over the past decade. From a low of 9% to a high of 20%, net imports have averaged 16% of U.S. production since 1962.

c. Uses

An estimated use pattern for sodium sulfate is given in Table 12. By far the largest use (ca. 70%) is in the kraft, or sulfate, pulping process of the paper industry. Sodium sulfate is converted to sodium sulfide, and with sodium hydroxide and water, forms a digesting solution for wood chips. Techniques for recovering impure sodium sulfate (saltcake) from the digesting liquor are constantly being improved, but present losses average about 100 pounds of saltcake per ton of pulp. Purchased saltcake is used to replace that which is not currently recovered. Use in kraft pulping has remained relatively constant at about 1.1 million tons for the last ten years. Increasing requirements due to growing pulp demand have been offset by improved sodium sulfate recovery techniques.

The second largest use of sodium sulfate (ca. 18%) is in detergent formulations. A small amount is added to all detergents as part of the manufacturing process, but increasingly, manufacturers have been adding additional purchased sodium sulfate to their formulations. This additional sodium sulfate partly compensates for the loss of bulk and detergency brought about by decreased phosphate content. Sodium sulfate use in detergent formulation has doubled from about 150,000 tons in the early 1960's to about 300,000 tons in 1972.

Use in the manufacture of glass, in textile finishing, and other uses constitute the remainder (ca. 12%) of U.S. consumption of sodium sulfate. In glass manufacture, sodium sulfate speeds the melting of the raw material charge, improves the working properties of high-silica glass, and, when carbon is added, forms sulfur dioxide gas. The sulfur dioxide bubbles have a "fining" effect, removing other gas bubbles as they move toward the surface of the molten glass.

Use of sodium sulfate in glass manufacture has decreased slightly over the past decade due to restrictions on the sulfur dioxide content of stack gases. Manufacturers are being forced to cut down on the amount of sodium sulfate in each batch of glass and to install scrubbing units which will allow recycling of sodium sulfate. Current consumption is about 140,000 tons per year.

In textile manufacture, sodium sulfate finds use in the finishing operation. The primary use is dye standardization; that is,

TABLE 12

USE PATTERN OF SODIUM SULFATE BY APPLICATION

Kraft (Sulfate) Paper Process Used with sodium sulfide and sodium hydroxide in the pulping-bleaching operation.	70%
Detergents Sodium sulfate is used in detergents to improve detergency and contribute bulk density to the formulation.	18%
Glass, Textile, and Other In approximate order of importance, sodium sulfate is used in "fining" glass, standardizing textile dyes, manufacturing cellulose sponges, as a cleaning and metal pickling agent, in mineral feed supplements, and in photography.	12%
	100%

Sources: Kirk-Othmer, Encyclopedia of Chemical Technology; Shreve, Chemical Process Industries; and Contractor's estimates.

dilution of the dye to a standard potency. Sodium sulfate is also added to the dye bath to level, or control, the color. Consumption of sodium sulfate for textile applications has remained fairly constant at an estimated 50,000 tons annually over the past several years.

Finally, several thousand tons per year of sodium sulfate find application in such uses as cellulose sponge manufacture, mineral feed supplements, cleansing agents, photography, and as a chemical catalyst.

d. Substitute Products

In applications which account for the bulk of U.S. sodium sulfate consumption, other products could be substituted with relative ease. The major consequence of such substitution would probably be increased manufacturing and product costs.

In kraft pulping operations, sodium sulfate is employed as the most economical source of make-up sodium and sulfur values. Other, more-expensive sources (e.g., sodium carbonate or caustic soda) could be substituted for the purchased saltcake, or "synthetic saltcake" may be manufactured by oxidizing a mixture of soda ash (sodium carbonate) and sulfur. Furthermore, the newer pulp mills will generate most, or all, of their saltcake requirements internally as a by-product of on-site chlorine dioxide bleach production. The only problem here is that sodium values must still be purchased outside, and high prices for sodium hydroxide or sodium carbonate can make this source of saltcake less attractive than purchased saltcake.

Increasing use of sodium sulfate in detergent formulation is, itself, the result of a substitution. Sodium sulfate, as an inexpensive electrolite, serves to replace some of the lost detergency and bulk to detergents with reduced phosphate content.

e. Geographic Consumption

An estimated geographic use pattern for sodium sulfate is given in Table 13. More than 60% of sodium sulfate demand is in the U.S. south, and approximately 90% of this demand is attributable to the kraft pulping industry.

Approximately 16% of U.S. sodium sulfate demand is in the north-central--Great Lakes region. The primary use in this region (*ca.* 60%) is in detergent formulation, with kraft pulping operations accounting for most of the remaining consumption.

The U.S. west and northwest require an estimated 14% of annual U.S. sodium sulfate supply. Kraft mills account for most (*ca.* 75%) of this regional demand; detergent formulation and other uses make up the rest.

In the U.S. northeast, it is estimated that half of the 7% regional consumption is for detergent formulations; most of the remaining half is split between kraft pulping and glass manufacture.

TABLE 13

GEOGRAPHIC USE PATTERN OF SODIUM SULFATE

South Approximately 90% - kraft pulping, 10% other.	63%
North Central - Great Lakes Approximately 60% - detergent formulation, 25% kraft pulping, 15% other.	16%
West and Northwest Approximately 75% - kraft pulping, 15% detergent formulation, 10% other.	14%
Northeast Approximately 50% - detergent formulation, 20% - kraft pulping, 20% glass fining, 10% other.	7%
	100%

Source: Contractor's estimates.

f. Captive Requirements

Production of sodium sulfate for captive use by producing companies is insignificant in the U.S. Nearly 90% of U.S. production is as by-product or co-product sodium sulfate. The small amount produced as primary product is produced for sale to end users. Table 14 shows a comparison of sodium sulfate production and shipments for the years 1962-1972. Shipments have averaged 99% of production over the last decade.

Production of by-product sodium sulfate during chlorine dioxide bleach manufacture at pulp mills, is the only significant case where by-product sodium sulfate is used in another operation by the same company.

g. Other Market Characteristics

Most of the sodium sulfate produced in the U.S. sells for about $20 per ton, with price as the main basis for competition. In this price range, freight costs become a significant consideration in marketing and distribution of the product. Local shipment may cost up to $15 per ton, and long distance shipping rates may be $24 per ton and more. These rates are relatively high compared to transatlantic bulk shipping rates of about $7 per ton, and allow foreign producers to compete effectively with U.S. companies located on the Atlantic coast.

Within the U.S., the relatively high freight costs cause local demand to be highly dependent on the proximity of sodium sulfate supply. Substitution may occur when freight-equalized costs of another product make its use more economical. An example is caustic soda as a source of sodium values for kraft pulping operations.

3. Supply Characterization

a. Manufacturing Routes

Sodium sulfate has rarely been produced in quantity for its own sake. A summary of sodium sulfate production by process, from 1964 to 1971, is given in Table 15. Only about one-third of the production classified as "natural" is recovered solely for sodium sulfate value, and in 1972, approximately 90% of U.S. production could be classified as by-product or co-product sodium sulfate.

By-product sodium sulfate is defined as sodium sulfate formed in a process which produces one or more other products of significantly higher value. These processes include manufacture of rayon and cellophane, lithium and strontium processing, and the chemical synthesis of sodium bichromate and resorcinol.

Co-product sodium sulfate is formed in a process which concurrently produces products having a value comparable to that of sodium

TABLE 14

CAPTIVE VS. COMMERCIAL CONSUMPTION OF SODIUM SULFATE
(Thousands of Tons)

Year	Production	Shipments[1]
1962	1,194	1,170
1963	1,233	1,226
1964	1,316	1,303
1965	1,404	1,364
1966	1,445	1,398
1967	1,364	1,384
1968	1,483	1,469
1969	1,475	1,439
1970	1,373	1,386
1971	1,356	1,377
1972	1,364	- -

1 Including interplant transfers.

Source: Current Industrial Reports, U.S. Department of Commerce.

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Table 15

PRODUCTION OF SODIUM SULFATE BY PROCESS
(Thousands of Tons)

Year	Mannheim Furnace	Polymer By-Product	Sodium Dichromate and Other	Natural	Total
1964	214	356	201	544	1,315
1965	224	382	190	608	1,404
1966	228	387	217	613	1,445
1967	196	346	228	594	1,364
1968	165	404	254	660	1,483
1969	181	388	282	624	1,475
1970	177	354	278	564	1,373
1971	162	362	210	622	1,356

Source: U.S. Department of Commerce.

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sulfate. Examples of such processes are the Mannheim and Hargreaves processes for producing hydrochloric acid, and the recovery of sodium sulfate from natural brines and salts which contain a variety of inorganics of similar value.

One producer, with about 10% of U.S. capacity, has plants which sell sodium sulfate recovered from natural brines as their sole source of revenue. This is the only significant case in which sodium sulfate is produced as a primary product.

Methods for sodium sulfate production may be divided into three categories: recovery from natural sources, production as a by-product of rayon and cellophane manufacture, and production accompanying the synthesis of various chemicals.

Recovery from natural brines accounts for about half of U.S. sodium sulfate production. Figure 4 illustrates, in flow chart form, a typical process for recovery of both anhydrous sodium sulfate and Glauber's salt, a hydrated form of sodium sulfate. The natural brine, containing dissolved sodium sulfate and other inorganics, is pumped into a natural salt deposit to reduce the solubility of sodium sulfate. When the saturated solution is cooled, Glauber's salt precipitates. The mixture is filtered, and the hydrated sodium sulfate is collected for direct sale or for further processing to anhydrous sodium sulfate.

Production of sodium sulfate as a by-product of viscose rayon or cellophane production is responsible for about 30% of U.S. sodium sulfate capacity. Figure 5 is a schematic diagram for production of sodium sulfate as a rayon by-product. The sodium sulfate is formed in a spinning bath when the basic viscose rayon dope is forced through the fine holes of a spinneret into a solution containing sulfuric acid. Sodium sulfate is produced at a rate of about 1.2 pounds per pound of rayon or cellophane. The spinning bath must be refreshed periodically by removing the sodium sulfate which has formed and replenishing the sulfuric acid.

The production of certain industrial chemicals results in the formation of sodium sulfate as a natural result of the process used. Approximately 20% of U.S. sodium sulfate capacity is of this type. Figure 6 is a simple flow diagram for the Mannheim hydrochloric acid process. Salt (sodium chloride) and sulfuric acid are heated together to form hydrogen chloride and crude sodium sulfate. The crude sodium sulfate may be further refined or converted to Glauber's salt depending on relative demand for the two products.

Other examples in this third category of sodium sulfate production include the Hargreaves process for hydrochloric acid, formation with sodium bichromate when sodium chromate is treated with sulfuric acid, and production accompanying the synthesis of phenol and resorcinol.

b. Producers

In 1972 there were 22 companies producing sodium sulfate in 32 locations. These companies, plant locations and capacities, and

FIGURE 4

RECOVERY OF SODIUM SULFATE FROM NATURAL BRINES

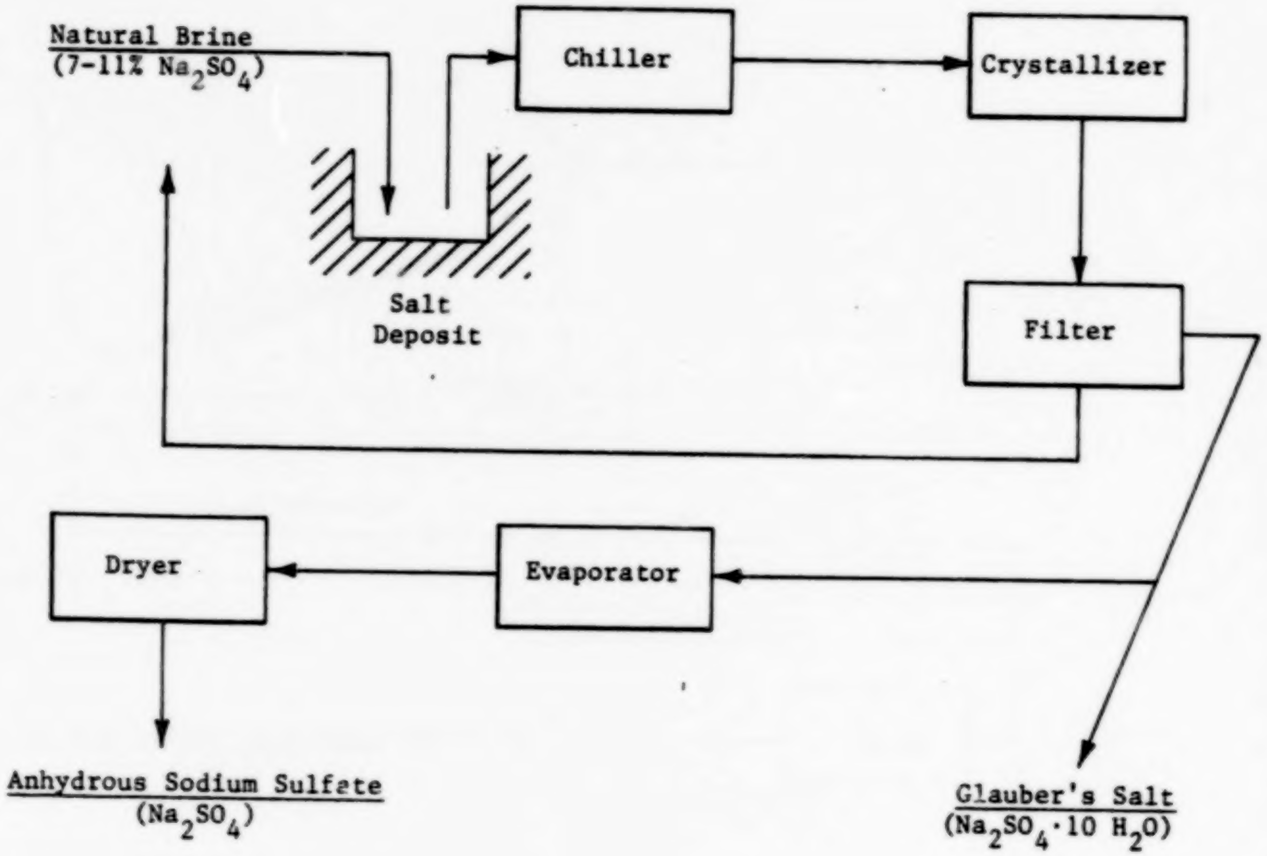


FIGURE 5

PRODUCTION OF SODIUM SULFATE IN VISCOSE RAYON PROCESS

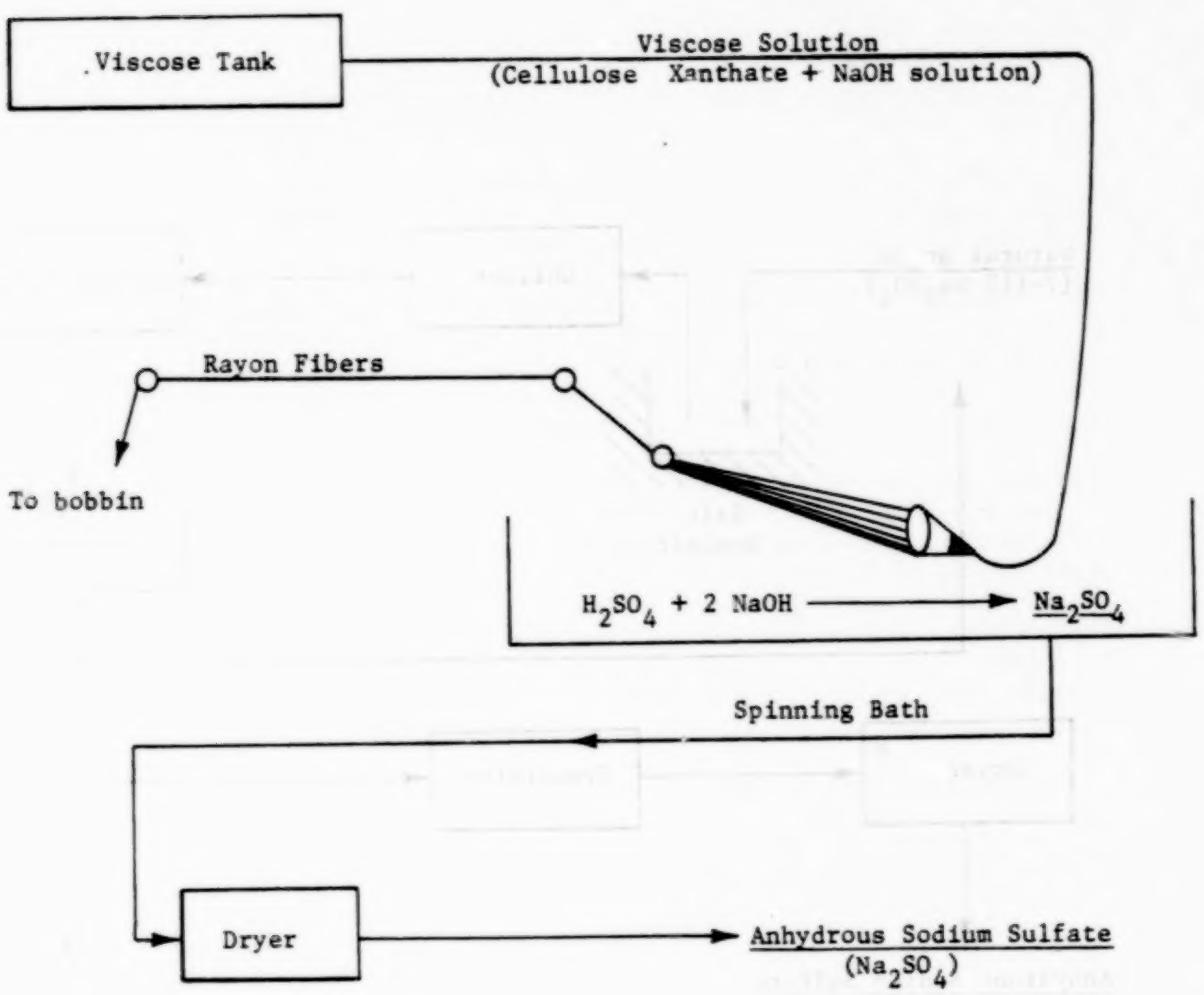
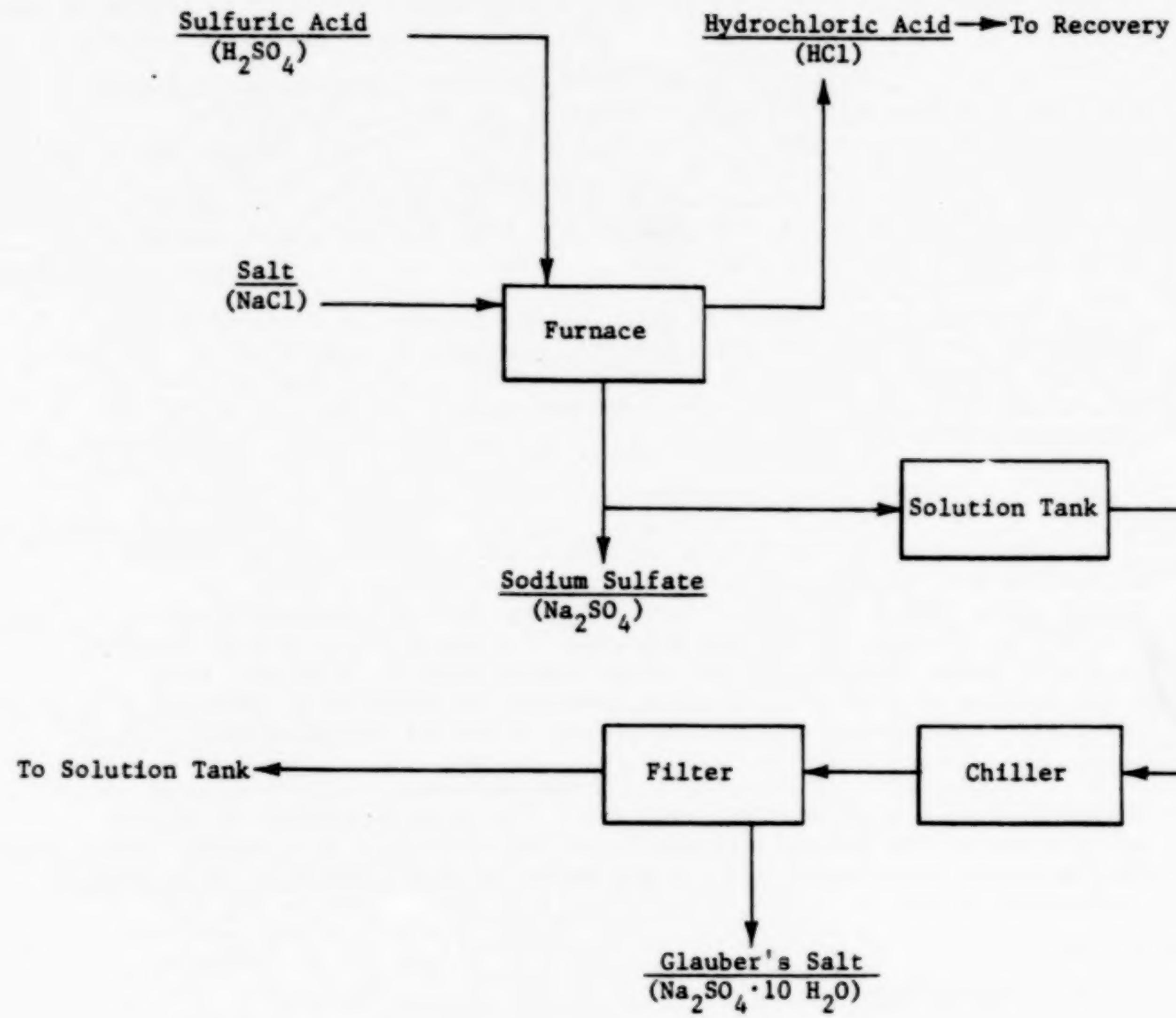


FIGURE 6

PRODUCTION OF SODIUM SULFATE IN THE MANNHEIM PROCESS



processes involved are given in Table 16. The five major producers accounted for 70% of 1972 U.S. capacity. Seven companies (10 plants) produce sodium sulfate from natural sources. Only one of these companies has facilities (2 plants) which produce sodium sulfate as their sole source of operating revenue. The others produce it as either a by-product or co-product along with other inorganics.

Five companies (11 plants) produce sodium sulfate as a by-product of rayon or cellaphane manufacture, and ten companies (11 plants) produce sodium sulfate as a by-product or co-product of chemical synthesis operations.

Seven plants having approximately 100,000 tons-per-year capacity each, were responsible for 60% of 1972 U.S. capacity, and would be classified as large producers of sodium sulfate. Fifteen plants, of 25,000 tons-per-year capacity or less, accounted for 12% of 1972 U.S. capacity, and would be classified as small. The remaining ten plants, with capacities between 25,000 and 100,000 tons per year each, accounted for 28% of 1972 U.S. capacity.

The base materials from which sodium sulfate is produced as a by-product are long-established chemical commodities. It is therefore not surprising that many of the plants producing sodium sulfate are fairly old. Most plants have been operating at least ten years; some nearly twenty years.

c. Manufacturing Economics

Raw materials for sodium sulfate production are either natural brines and salt deposits or sodium alkalis and sulfuric acid. In either case, nearly all of the manufacturing cost is represented by separation, drying, and packaging costs. In the case of natural sources, depletion costs must be covered; where sodium sulfate is formed as a joint product of some manufacturing process, raw material costs are often allocated to each product according to its relative value.

We understand that water pollution abatement costs have been developed only for chrome saltcake, i.e., that sodium sulfate produced as by-product from sodium bichromate manufacture. For that reason, our sodium sulfate manufacturing cost estimates are included with the sodium bichromate costs.

4. Supply/Demand Balance

Sodium sulfate has had an inverse relationship from that most often associated with the law of supply and demand. With nearly 90% of sodium sulfate production resulting from processes in which it is a by-product or co-product of some other material, and with both a low price and low profit margin, demand for this product has traditionally followed supply.

TABLE 16

SODIUM SULFATE PRODUCERS -- LOCATION AND CAPACITY

(Thousands of Tons)

Producer	Location	Annual Capacity	Process
Akzona Inc.			
American Enka Co., div.	Enka, N.C.	20	Polymer by-product
	Lowland, Tenn.	36	Polymer by-product
Allied Chem. Corp.			
Industrial Chems. Div.	Baltimore, Md.	50	Bichromate by-product
American Cyanamide Co.			
Indust. Chems. & Plastics Div.	Ft. Worth, Tex.	13	Catalyst by-product
IRC Fibers Co., subsid.	Painesville, Ohio	33	Polymer by-product
Chem. Met Corp.	Chicago, Ill.	--	
Climax Chem. Co.	Monument, N.M.	36	Mannheim furnace (HCl by-product)
Courtaulds North America, Inc.	Le Moyne, Ala.	25	Polymer by-product
El Paso Natural Gas Co.			
Beaunit Corp, subsid.			
Beaunit Fibers Div.	Elizabethton, Tenn.	25	Polymer by-product
FMC Corp.			
American Viscose Div.	Fredricksburg, Va. Fort Royal, Va. Lewistown, Pa. Marcus Hook, Pa. Nitro, W. Va. Parkersburg, W.Va.	275	Polymer by-product
Great Salt Lake Minerals & Chems. Corp.	Ogden, Utah	150	Natural; co-product
Green Bay Packaging, Inc.	Green Bay, Wisc.	--	By-product

TABLE 16 (Continued)

Producer	Location	Annual Capacity	Process
Gulf Resources & Chem. Corp. Lithium Corp. of America - Inc., subsid.	Bessemer City, N.C.	18	By-product
Hercules, Inc. Coatings & Specialty Products Dept.	Glens Falls, N.Y. Hopewell, Va.	20	Bichromate by-product Polymer by-product
Kerr-McGee Corp. Kerr-McGee Chem. Corp. subsid.	Trona, Calif.	250	Natural, co-product
Koppers Co., Inc. Organic Materials Div.	Petrolia, Pa	15	Resorcinol by-product
Morton-Norwich Products, Inc. Morton Chem. Co. div.	Weeks Island, La.	120	Hargreaves furnace (HCl by-product)
Nalco Chem. Co. Industrial Div.	Chicago, Ill.	10	By-product
Ozark-Mahoning Co.	Brownfield, Tex. Seagraves, Tex.	185	Natural, sole product Natural, sole product
Pratt Sodium Co.	Casper, Wyo.	2	Natural, by-product
Reichhold Chems., Inc.	Tuscaloosa, Ala.	--	Phenol by-product
Stauffer Chem. Co. Indust. Chem. Div.	San Francisco, Calif. West End, Calif.	228	Boric acid co-product Natural
U.S. Borax & Chem. Corp.	Boron, Calif. Wilmington, Calif.	44	Boric acid co-product Boric acid co-product
		Total: 1,555	

Sources: Trade journals, industry reports.

With this type of relationship, there is often a time lag between increased supply and the development of new applications for the product. While supply often exceeds demand, the reverse is rarely true.

Evidence of this relationship of demand following supply is seen in the use pattern of sodium sulfate. From a technological point of view, very few uses of sodium sulfate result from unique chemical or physical properties of the compound. Rather, because of its relatively low price, sodium sulfate is often used wherever its chemical or physical properties allow its substitution in place of a more expensive material.

Substitution of sodium sulfate for higher cost materials wherever possible is a healthy economic practice, and does not detract from the importance of this chemical to both manufacturers and consumers. Even so, an excess of supply over demand is likely in the future, as water pollution abatement guidelines become more stringent. More rigorous water quality standards will have a dual effect: increasing recovery of by-product sodium sulfate, and decreasing consumption of sodium sulfate by kraft pulping mills and detergent manufacturers. Rayon and cellophane manufacturers, for example, currently recover only about one-third of the sodium sulfate produced by the industry. Kraft pulping mills, on the other hand, experienced sodium sulfate "losses" (in plant effluent) of about 250 pounds per ton of pulp in 1950, had reduced these losses to approximately 100 pounds per ton by 1972, and may be forced to reduce these losses by an additional 50% in the next decade. This lower demand as a result of kraft pulping effluent guidelines is in addition to reduced demand due to technical changes in bleaching and pulping operations.

In view of the joint-product nature of most U.S. sodium sulfate production, capacity figures are less meaningful for this chemical than for most others. Reported capacity is often much lower than theoretical capacity, and depends on the degree of commitment to recovering the sodium sulfate produced. Nevertheless, in terms of reported capacity, production of sodium sulfate has varied from 75% of capacity in 1964, to 100% in 1968. Production in 1972 represented approximately 90% of reported capacity.

On a regional basis, the U.S. south, northcentral, and northeast are net consumers of sodium sulfate, while the west and northwest are net producers. European sources supplement supplies to the U.S. south, and Canadian sources provide additional sodium sulfate to northern U.S. markets.

5. Prices

Published and actual prices of sodium sulfate for representative years since 1950 are given in Table 17. The published price for lower purity sodium sulfate (saltcake) has been \$28 per ton since 1955. Actual prices for this grade have varied erratically in a narrow range from \$20 to \$22 per ton, indicating an average discount of 25%.

TABLE 17

SODIUM SULFATE PRICES -- PUBLISHED VS. ACTUAL

(Dollars per Short Ton)

Year	Published Price[1]		Actual Price[2]	
	Lower Purity	High Purity	Lower Purity	High Purity
1950	22	40	12	17
1955	28	52	22	27
1960	28	54	22	29
1965	28	56	21	27
1970	28	48	20	21
1971	28	43	21	20
1972	28	--	--	--

[1] Published prices bulk, works, 100% Na_2SO_4 basis for lower purity; bags, carlots, delivered East for high purity Na_2SO_4.

[2] Actual price: Value of Shipments/tons shipped.

Sources: Chemical Marketing Reporter, U.S. Department of Commerce, and Contractor's estimates.

Prices for higher grades of sodium sulfate are more difficult to characterize due to the number of different grades in this category, but it appears that considerable discounting occurs, and that the average price commanded by higher grades has declined in recent years. In 1971, the average price of high-purity sodium sulfate was below that of the lower quality grade. This unusual situation is most likely the result of increased recovery of this high-purity grade from rayon manufacture.

C. TITANIUM DIOXIDE

1. Summary

In 1972, U.S. titanium dioxide (TiO_2) consumption, including imports, was approximately 787,000 tons, with paint, paper and plastics applications accounting for nearly 80% of the total. Market demand growth in recent years has been at a 3% to 4% rate and is expected to continue at least at that rate through 1975. Imports remain a relatively small proportion (10%) of sales and are generally used only in non-critical, lower-cost applications.

While TiO_2 is sold in volumes comparable to those of some commodities, it is marketed more as a specialty chemical rather than a commodity. Producers' marketing efforts in recent years have been centered around grade improvement, quality control, and customer-oriented technical service. Depending on particular product expertise, individual producers frequently are strong in one market segment, such as paper, but do not fare as well in another--paint, for instance.

Current list prices are 28.5¢ per pound for rutile grades, 24¢ per pound for paper grade, and, at these prices, TiO_2 frequently is one of the more expensive raw materials in its end-use application. List prices have historically been stable or slowly rising, with the industry generally attempting to move as a whole to a given new price level. A long-established 1¢ per pound price differential between anatase and rutile grades disappeared in 1971 and both grades are currently offered at the same list price. Due mostly to overcapacity problems, the industry has been plagued with substantial price discounts which forced several major producers to operate at a loss in the 1970-71 period. Prices have firmed in recent months.

TiO_2 is manufactured by either of two processes--sulfate and chloride. Current domestic manufacturing capacity is about 817,000 tons, approximately 54% of which is sulfate. The sulfate process is older and employs sulfuric acid to separate and recover TiO_2 from ilmenite, the principal raw material used in this manufacturing route. The sulfate process has the disadvantage of producing a large amount of potential pollutants in the form of spent sulfuric acid and ferrous sulfates (copperas). Depending on processing steps employed, both anatase and rutile, the two chemical forms of TiO_2, can be produced. Estimated current manufacturing cost for pigment via the sulfate process is approximately 21¢ per pound, including pigment finishing steps.

The alternate method of production, and the one employed in every TiO_2 plant built since 1956, is the chloride process. In this process,

chlorine is reacted at high temperature with the raw ore, generally rutile, a high TiO_2-content material. TiO_2 is recovered later in the process through further chemical treatment, and approximately 90% of the chlorine is recovered for reuse. Due to higher quality ore and reactant recycling, the chloride process produces far less pollutant by-product than the sulfate process. Although rutile pigment has been the sole product from the chloride process in the past, Du Pont will begin production of both anatase and rutile grades upon conversion of its Edgemoor, Delaware, plant to 100% chloride production in 1974. Chloride pigment has more uniformly consistent particle size, hence it offers greater hiding power and is used preferentially in certain critical applications such as automotive paint. Current chloride process manufacturing cost is estimated at nearly 23¢ per pound.

TiO_2 for commercial production is obtained from four principal sources--ilmenite, rutile, leucoxene, and slag. Ilmenite contains approximately 50% TiO_2, is mined virtually worldwide, and is the basic raw material for the sulfate process and for Du Pont's chloride process plants. World supply is plentiful with present production of nearly three million short tons per year. U.S. production is approximately 700,000 short tons. Rutile, containing 95+% TiO_2, is the raw ore for most chloride production and is found almost exclusively in Australia. World supplies are believed to be limited to 20-25 years at present production rates of over 400,000 long tons per year. No rutile is mined in the U.S.

Leucoxene and titanium slag, used in sulfate production, are relatively minor sources of TiO_2 worldwide, although over 100,000 tons of Canadian slag are imported into the U.S. every year.

2. Market Characterization

a. Market Size and Growth

U.S. market demand for TiO_2 pigments in 1972 was approximately 787,000 short tons, valued at nearly $433 million on a delivered basis. Table 18 shows the recent history of TiO_2 production, trade and shipments data. Since 1965, overall market growth has been at an annual rate of 3% to 4%, although certain individual end-use segments, such as plastics, have grown considerably faster.

Exports of TiO_2 have remained quite small, less than 2% to 3% of domestic production, and have actually declined somewhat in recent years. Imports, on the other hand, have ranged in recent years from 5% to 10% of total apparent consumption, although 1972 saw a large jump to 86,400 tons, or 11% of apparent consumption. Imports will probably continue at present percentage levels for the foreseeable future.

b. Product Uses

Table 19 identifies the major end uses and recent consumption history for TiO_2 pigments. Paint and coatings applications, currently

TABLE 18

TiO_2 APPARENT CONSUMPTION AND INDUSTRY SHIPMENTS

(Thousands of Tons)

Year	Production	Imports	Exports	Stocks	Apparent Consumption	Total Shipments	Commercial Shipments
1965	576.7	49.6	17.0	101.7	606.3	573.0	524.5
1966	594.5	48.0	15.0	98.5	630.7	593.3	545.4
1967	589.4	46.8	14.0	103.3	617.4	582.3	542.5
1968	623.7	53.3	15.0	94.2	671.1	632.1	564.4
1969	664.3	53.2	14.0	100.8	684.3	654.5	590.1
1970	655.3	60.2	15.0	106.9	691.4	643.7	560.9
1971	677.8	42.8	14.0	89.7	723.6	684.7	581.2
1972	687.3	86.4	10.0	66.3	787.1	-----	-----

Sources: U.S. Department of Commerce "Current Industrial Reports" and Tariff Commission trade data.

TABLE 19

TiO_2 MARKET CONSUMPTION
(Thousands of Tons)

	1965	1970	1972
Paint and Coatings	345	375	390
Paper	110	147	158
Plastics	27	59	78
Rubber	31	35	35
Floor Covering	29	30	30
Printing Ink	12	18	20
Ceramics	10	17	21
Synthetic Fibers	6	10	10
Roofing Granules	4	5	5
Other	26	34	40
Total	600	730	787

Source: Contractor's estimates.

accounting for 50% of total consumption, constitute the major use for TiO_2. Two other end uses, paper and plastics, have grown rapidly in recent years, and in 1972, accounted for an additional 30% of TiO_2 consumption.

(1) Paint and Coatings

The paint and coatings industry is comprised of two basic segments--trade and industrial--with trade sales accounting for about 60% or 235,000 tons of TiO_2 consumption in the paint industry. Due to its interior hiding power and dispersibility (relative to rutile), anatase grade TiO_2 is rarely used, exceptions being low-cost applications such as highway paint. Within rutile grades, chloride process pigments account for about 60%, or 240,000 tons of paint pigment.

Sulfate producers have worked hard in recent years to eliminate previous performance deficiencies of sulfate rutile grades, and for many trade sales applications, such as interior wall paint and exterior house paint, sulfate and chloride grades are interchangeable. In industrial applications, the chloride process pigments, with Du Pont's R-900 series grades as the industry standards, enjoy clear superiority.

A critical factor in selling TiO_2 to the paint industry is a customer-oriented marketing effort. With TiO_2 pigment cost typically comprising 10% to 25% of paint selling price, paint manufacturers demand quality technical service and grade development to meet ongoing paint application needs. Imported TiO_2 has fared poorly in the paint industry due to lack of good customer service.

(2) Paper

1972 TiO_2 sales to the paper industry were about 158,000 tons and sales to the industry have been growing at 6% per year. Anatase grade pigments, because of their lower cost, account for about 70%, or 110,000 tons, of pigment sales. (TiO_2 frequently competes with 10 to 12¢ per pound clays for whitening and opacity filler applications; hence cost is a critical factor, and imported anatase grades have made their most successful penetration in this market.)

There are two main application areas within the paper industry--beater and coatings. Beater applications call for pigment addition directly to the paper pulp, and there is much grade and supplier interchangeability. A recent trend in beater use has been an increased TiO_2 requirement as paper sheet has become thinner while retaining opacity. In the coating area, use of rutile grade TiO_2 has been increasing, and there is less grade interchangeability than in beater use.

(3) Plastics

The fastest growing market segment for TiO_2 is plastics, with 1972 consumption of about 78,000 tons and a recent growth rate of nearly

17% a year. Major application areas included polyethylene injection molding and film production, polystyrene extrusions, and vinyl extrusions, such as outdoor siding and moldings. Product performance is the critical factor in plastics use, and rutile accounts for over 95% of TiO_2 sales. Rutile pigment, both chloride and sulfate, is superior to anatase in dispersion and resistance to discoloration and weathering. Technical service is very important, and it is common for producer and user to work together in developing new applications. Imported TiO_2, again due to lack of customer service, has made little headway in this market.

(4) Other Applications

The remaining applications shown in Table 19 make up the remaining 161,000 tons of TiO_2 consumed in 1972. Individual applications and their consumption relative to the total are as follows: rubber, 4%; floor covering, 4%; printing ink, 2.6%; ceramics, 2.6%; synthetic fibers, 1%; roofing granules, 0.5%.

c. Substitute Products

TiO_2 use presently is threatened by substitute products in only one market segment, paper. There TiO_2 enjoys the advantage of being an effective opacifier, but it is at a cost disadvantage to alumina and silica clays, some of which offer nearly equivalent brightness as TiO_2. In the paint industry, TiO_2 is by far the most effective white pigment in terms of hiding power, a key to the trend toward one-coat paint applications. While pigment research is extensive, no equally effective substitute has been found. In plastics and rubber, TiO_2 offers the best combination of white pigment cost, dispersion, and resistance to discoloration. In other product application areas, no substitute products represent serious threats to TiO_2's present position.

d. Captive Consumption

The major captive use of TiO_2 pigment is in the paint industry, where three of the top six TiO_2 consumers have their own pigment plants. Table 20 details captive TiO_2 consumption and shows the rise in captive use as a percentage of apparent consumption from 8% in 1965 to 14% in 1971. Sherwin-Williams, Du Pont, Glidden-Durkee, and NL Industries are the major captive users, and it is believed that these companies account for virtually all of the captively-consumed TiO_2 pigment.

3. Supply

a. Manufacturing Processes

Two commercial processes are presently employed to produce TiO_2 pigments--the sulfate process and the chloride process. The sulfate process is older and is the process employed by most of the existing worldwide

TABLE 20

TiO_2 CAPTIVE CONSUMPTION

(Thousands of Tons)

Year	Total Shipments	Commercial Shipments	Captive Consumption[1]	Percent Apparent Consumption
1965	573.0	524.5	48.5	8.0
1966	593.3	545.5	47.8	7.6
1967	582.3	547.5	39.8	6.4
1968	632.1	564.4	67.7	10.1
1969	654.5	590.1	64.4	9.4
1970	643.7	560.9	82.8	12.0
1971	684.7	581.2	103.5	14.3

[1]Captive consumption is calculated as total shipments - commercial shipments.

Source: Current Industrial Reports, U.S. Department of Commerce.

capacity. The chloride process was developed in the 1950's and is used in all new TiO_2 plants built in the U.S. since 1956. In recent years chloride process plants have become increasingly widespread in Europe as well.

(1) Sulfate Process

Figure 7 left-hand side, is a schematic representation of the sulfate process. In the first step ilmenite, an ore or sand containing 40-60% TiO_2, or titanium slag, containing 60-70% TiO_2, is digested with sulfuric acid. The amount of acid required ranges from 2.5 to 4.5 pounds per pound of finished pigment and depends on the TiO_2 content of the ore. In addition to the formation of titanium sulfate salts, substantial amounts of ferrous sulfate are also formed since the other major component of ilmenite is iron oxide, FeO. The remainder of the process involves separating the various sulfate salts, with iron being removed from the process as hydrated ferrous sulfate, copperas, and TiO_2 being precipitated in the hydrolysis step. This final chemical form of the TiO_2 pigment, anatase or rutile, is determined by the nucleus crystal used to seed precipitation in this step. The TiO_2 precipitate is next calcined at temperatures of up to 1250° C, during which adsorbed sulfur trioxide and water are driven off and, if rutile seeds were used in the hydrolysis step, rutile-type pigment is formed. The pigment finishing process will be described later.

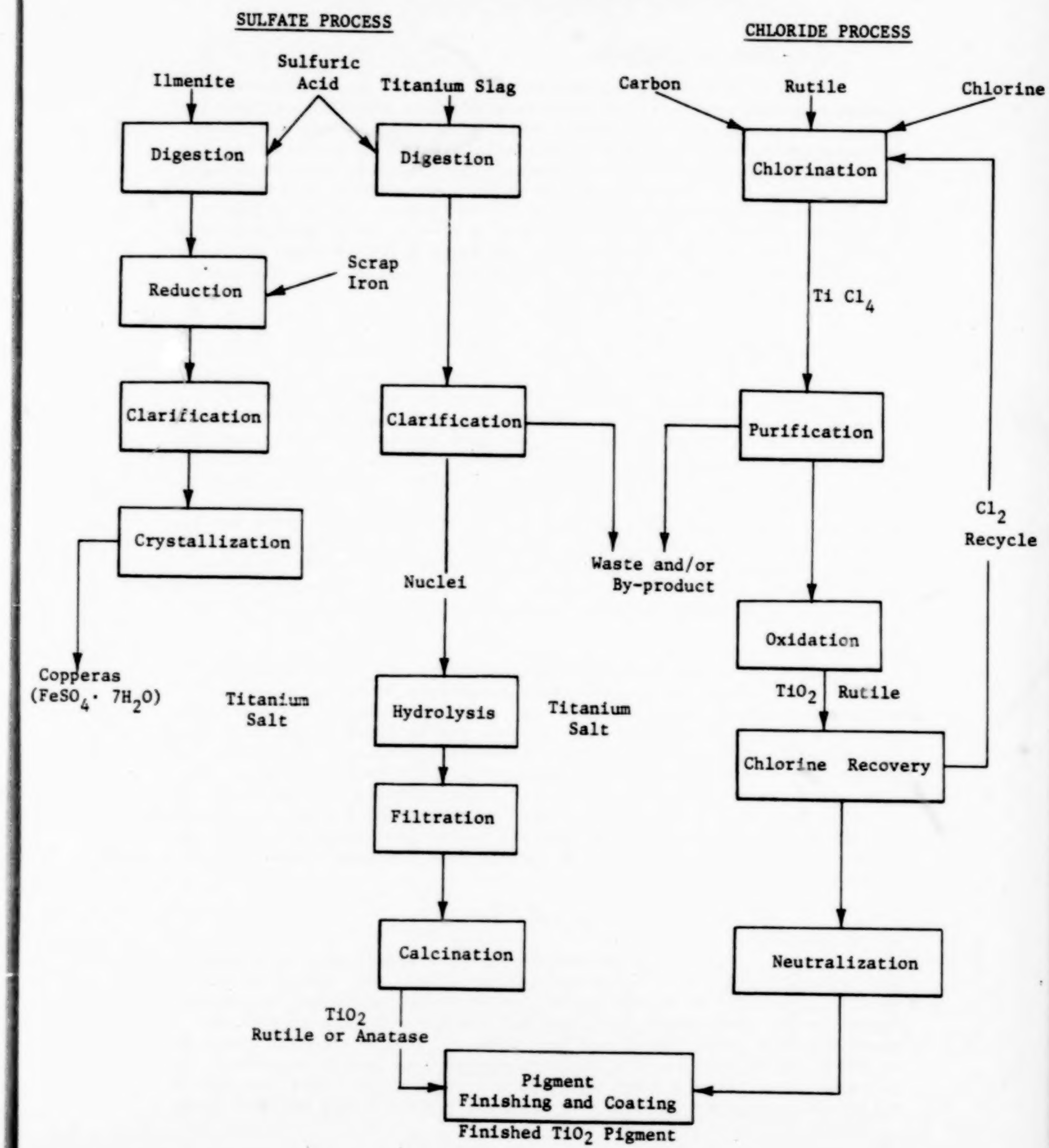
(2) Chloride Process

The chloride process typically utilizes rutile ore containing 90% to 97% TiO_2 as its raw material. Du Pont has developed the capability to use ilmenite, thereby lowering its raw material costs significantly. Figure 7 right-hand side, outlines the process. In the first step, rutile ore is burned with chlorine gas to produce titanium tetrachloride. This material is separated from the reaction mixture via distillation, then is oxidized at high temperature to produce TiO_2 particles, which are quickly quenched. The quenching process allows extremely close control of pigment particle size which is essential in developing hiding power of the pigment. Chlorine is recovered in the oxidation process and is recycled for use in the first step. As in the sulfate process, the refined TiO_2 pigment is sent to finishing steps which enhance the surface properties of the pigment particles.

Although the chloride process is conceptually straightforward and does not produce the substantial quantities of waste materials that the sulfate process does, it has been extremely difficult to operate commercially. One problem has been the extreme corrosiveness of the high temperature chlorine employed. A second, more fundamental problem, has been the oxidation step, which is extremely sensitive to burner configuration and to product recovery methods. Du Pont is the most successful in this regard and holds significant patent protection in this technology.

FIGURE 7

TiO_2 PIGMENT MANUFACTURING PROCESSES



(3) Pigment Finishing

Before pigment from either process is sold, it is processed through a series of finishing operations in which specific particle surface properties are developed. These properties in turn determine characteristics such as pigment dispersibility and durability. For instance, pigment intended for plastics use is usually treated with an organic agent, dimethyl siloxane, to enhance the pigment's compatibility with the plastic system. Sulfate producers have made their pigments more competitive with chloride pigments in recent years through careful control of particle size and coating characteristics obtained in finishing operations. Such finishing steps generally add 1-2¢ to the basic manufacturing cost of the pigment.

b. Producers

At the end of 1972, there were 11 domestic TiO_2 producers operating 15 plants, all but one of which are in the eastern half of the U.S. Table 21 summarizes pertinent information regarding these facilities. Since 1956, chloride process facilities have accounted for all new TiO_2 pigment plant construction. Possibly reflecting producer's uncertainty about process technology and economics, individual capacity of most chloride plants is in the 25,000 to 30,000 ton range. The notable exception is Du Pont, which is increasing the capacity of their New Johnsonville, Tennessee, plant to 195,000 tons by year-end 1973 and is actively considering a new 100,000 ton chloride facility in Georgia. Two producers, PPG and NL Industries, have recently closed their chloride facilities, moves reportedly due to raw material supply and economics problems.

Several of the large producers--Du Pont, NL Industries, and Glidden-Durkee--have integrated their operations backward to provide captive supplies of ilmenite ore. (No domestic producer has a captive source of rutile as virtually all of this raw material is imported from Australian producers.) These three producers have also achieved forward integration through captive TiO_2 supply for their paint products. No other domestic producers have achieved integration to a comparable extent. Most TiO_2 plants are isolated manufacturing facilities, although a few are part of larger, multi-product facilities, and most plants produce and sell titanate and other salts as by-products from the process.

c. Manufacturing Economics

Tables 22 and 23 summarize estimated manufacturing economics and profitability for a 25,000 ton sulfate plant. The costs for raw materials, utilities, direct labor, and overhead, are based on current estimates for these items. For the sulfate process, two investment bases are used--replacement and depreciable. The replacement basis is an ADL estimate of current plant replacement cost and is used for calculation of insurance and maintenance, since these items are best reflected by current costs and replacement value. A depreciable basis

TABLE 21

TiO_2 MANUFACTURING LOCATIONS AND CAPACITIES

(Thousands of Tons)

Company	Location	Annual Capacity	Process[4]	Raw Material	Start-Up Year
American Cyanamid	Savannah, Ga.	70	S	Imported ilmenite, slag	1955
		40	C	Imported rutile	1966
		110			
Cabot	Ashtabula, Ohio[5]	27	C	Imported rutile	1964
Combustion Engineering	Camden, N.J.	n.a.	→	→	→
	Wilmington, Del.	n.a.	→	→	→
E.I. Du Pont	Antioch, Cal.	27	C	Imported rutile	1963
	Edgemoor, Del.[1]	100	S	Captive ilmenite, slag	1935
			C	Captive mixture of ilmenite/ leucoxene, imported rutile	1956
	New Johnsonville, Tenn.[2]	141	C	Captive mixture of ilmenite/ leucoxene, imported rutile	1959
		268			
N.J. Zinc (Div. of G&W)	Gloucester City, N.J.	42	S	Slag	1946
Kerr-McGee	Hamilton, Miss.	45	C	Imported rutile	1965
Lonza	Mapleton, Ill.	n.a.	→	→	→
N.L. Industries	St. Louis, Mo.	108	S	Captive ilmenite	1923
	Sayreville, N.J.[3]	115	S	Captive ilmenite	1918
			C	Imported rutile	1966
		223			
Glidden-Durkee (Div. of SCM)	Baltimore, Md.	50	S	Captive ilmenite, slag	1956
		25	C	Imported rutile	1970
		75			
Sherwin-Williams	Ashtabula, Ohio	27	C	Imported rutile	1969
Transelco	Penn Yan, N.Y.	n.a.	→	→	→
		817			

[1] Converting to all-chloride process and expanding to 112,000 tons by year end 1973.
[2] Expanding to 195,000 tons by year end 1973.
[3] Announced closing January 1973.
[4] S = Sulfate; C = Chloride.
[5] Plant being operated by N.J. Zinc (Div. of G&W) under lease-purchase agreement.

Sources: Chemical Economics Handbook and Contractor's estimates.

TABLE 22

TiO_2 MANUFACTURING ECONOMICS--SULFATE PROCESS

Basis: Sulfate Process
25,000 T/Yr, 100% of Capacity
330 Days/Yr
Replacement Investment--$26,325,000[1,3]
Depreciable Investment--$15,000,000

Item	Unit	$/Unit	Units/Ton	$/Ton Pigment
Raw Materials				
Ilmenite (56% TiO_2)	Ton	21.00	1.87	39.27
Sulfur	Ton	30.00	0.88	26.40
Caustic	Ton	55.00	0.20	11.00
Other Chemicals	---		----	30.00
				106.27
Utilities[2]				
Water	MGal	0.10	220	22.00
Electricity	kwh	0.014	525	7.35
Natural Gas	MMBtu	0.60	10	6.00
				35.35
Direct Labor[2,4]				
Supervision	Man Hr	7.50	1.58	11.85
Operators	Man Hr	5.00	4.43	22.15
Helpers	Man Hr	4.00	3.80	15.20
				49.20
Overhead				
@ 100% Direct Labor		----	----	49.20
Maintenance, Labor, and Supplies				
@ 7% of Replacement Investment/Yr				73.71
Depreciation				
@ 9.1% of Depreciable Investment/Yr				54.60
Insurance and Local Taxes				
@ 2.0% of Replacement Investment/Yr				21.06
Total Manufacturing Cost Per Ton				$389.39
Manufacturing Cost Per Lb. Pigment				$ 0.195

[1]Capital investment based on Contractor's estimates.
[2]Assumes wage rates and utilities rates of New Jersey area.
[3]Assumes capital cost of H_2SO_4 plant included. Does not include solid waste handling capital or operating costs.
[4]See labor schedule included.

Source: Contractor's estimates.

TABLE 22 (Continued)

LABOR SCHEDULE
TiO_2 PRODUCTION--SULFATE PROCESS

	Supervisors	Operators	Helpers
Feed Preparation Section	1	1	2
Digestion and Separation Section		4	3
Hydrolysis--Precipitation Section	1	3	2
Purification Section	1	1	1
Calcination--Dry Milling Section	1	1	1
After Treatment Section	1	3	3
Sulfuric Acid Plant	—	1	—
Total--Men/Shift	5	14	12

TABLE 23

TiO_2 PIGMENT PROFITABILITY--SULFATE PROCESS

Investment: $15,000,000
Manufacturing Cost: $0.195

	Rutile Grade	70/30 Rutile/Anatase Mix	Anatase Paper Grade
Pigment Selling Price	$0.275/Lb.	$0.26/Lb.	$0.24/Lb.
Gross Profit/Lb.	0.080	0.065	0.045
Gross Profit/Ton	160.00	130.00	90.00
Freight at 5% of List Price Sales/Ton	27.50	27.50	27.50
General, Selling, & Administrative @ 7.5% of List Price Sales/Ton	41.25	41.25	41.25
Profit Before Taxes/Ton	91.25	61.25	21.25
Profit After Taxes/Ton	46.62	30.62	10.62
Profit After Taxes as % of Sales	8.3	5.9	2.2
	CASH FLOW		
Profit After Taxes/Ton	46.62	30.62	10.62
Plus Depreciation/Ton	54.60	54.60	54.60
Total Cash Flow/Ton	101.22	85.22	65.22
Total Cash Flow @ 25,000 Tons	2,540,000	2,130,000	1,630,000
Investment	15,000,000 →		
Working Capital (3 months' operating costs)	2,433,000 →		
	17,433,687 →		
Payback (Yrs)	6.9	8.2	10.7
% Return on Capital Employed	15.0	12.0	9.3

Source: Contractor's estimates.

of smaller dollar size than replacement value is used for depreciation since most sulfate plants are 20 to 30 years old, and current depreciable assets are restricted to recently replaced process equipment and newly installed finishing equipment. A depreciation rate of 9.1% per year is used as this rate is the highest allowed by the Internal Revenue Service for chemical industry facilities. Since all TiO_2 grades are sold on a delivered basis, a freight charge of 5% of list price has been included in Table 23. General selling and administrative charges of 7.5% of list price sales reflect the relatively expensive selling effort required for TiO_2 pigments.

Table 23 shows that depending on grade and price, after tax profitability ranges from 7.1% down to 2.2% of sales. In addition, return on capital could theoretically be as high as 13.7% after tax, although 11.5%, based on a product mix of 70:30 rutile/anatase grades, is probably more representative of actual industry performances.

Tables 23 and 24 detail similar costs and profitability figures for a 25,000-ton chlorine plant. The depreciable and replacement investment basis are considered the same in this case since most chloride plants not only are relatively new with substantial original book value remaining, but also have experienced the updating of process and finishing equipment found in sulfate process plants. As seen in Table 25, while the after-tax profit percentage is low, 3.6%, the return on capital, at 10.2%, is considerably higher. By virtue of a large depreciation tax shield, the chloride process apparently generates substantial cash flow, despite low-book profits. It should be noted that chloride profit margins have shrunk recently, largely due to the dramatic rise in rutile ore prices, now $175 per ton and higher. Ore cost comprises over 50% of the cost of manufacture, and this item has been most responsible for the elimination of the chloride process' earlier cost advantage over the sulfate process. Chloride pigment producers are anxious to see this cost drop through either more widespread use of ilmenite or through successful commercialization of synthetic rutile production. An important factor in economical chloride production is recovery and recycle of chlorine gas after the oxidation step. The highly corrosive nature of chlorine makes this step difficult, but failure to do so can result in extraordinarily high use of make-up chlorine.

d. Raw Materials

Ready availability of inexpensive raw materials is one of the key requirements for the continued production of low-cost TiO_2 pigments. Economic production via the chloride process has been seriously threatened by the recent, dramatic increase in rutile ore prices. In contrast, ilmenite prices have risen only slightly to $35 per ton. The reason for these different behaviors is the supply/demand balance for each ore.

Ilmenite is mined virtually worldwide, with 1971 world production being almost 2.9 million short tons. U.S. ilmenite production has declined from 930,000 tons in 1969 to 680,000 tons in 1971, but worldwide

TABLE 24

TiO_2 MANUFACTURING ECONOMICS--CHLORIDE PROCESS

Basis: Chloride Process
25,000 T/Yr, 100% of Capacity
330 Days/Yr
Investment (Depreciable and Replacement)--$21,330,000[1]

Item	Unit	$/Unit	Units/Ton	$/Ton Pigment
Raw Materials				
Rutile	Ton	175.00	1.17	204.75
Coke	Ton	24.00	0.35	8.40
Chlorine	Ton	50.00	0.21	10.50
Chemical Additives	---	-----	----	7.00
				230.65
Utilities[2]				
Water	MGal	0.10	23	2.30
Electricity	kwh	0.014	750	10.50
Natural Gas	MMBtu	0.60	10	6.00
Refrigeration	Ton/Day	3.00	2.5	7.50
				26.30
Direct Labor[3]				
Supervision	Man Hr	7.50	0.95	7.12
Operators	Man Hr	5.00	5.4	27.00
				34.12
Overhead				
@ 100% Direct Labor				34.12
Maintenance, Labor, and Supplies				
@ 6% of Investment/Yr				51.19
Depreciation				
@ 9.1% of Investment/Yr				77.63
Insurance and Local Taxes				
@ 2% of Replacement Investment/Yr				17.06
Total Manufacturing Cost Per Ton				$454.01
Manufacturing Cost/Lb Pigment				$ 0.227

[1] Capital Investment based on Contractor's estimates.
[2] Assumes wage and utilities rates of New Jersey.
[3] See labor schedule included.

TABLE 24 (Continued)

LABOR SCHEDULE
TiO_2 PRODUCTION--CHLORIDE PROCESS

Operators	Men/Shift
Load in	1
Chlorination reactor	1
Quench, $TiCl_4$ recycle, storage	1
Sludge filter, waste	1
$TiCl_4$ purification	2
$TiCl_4$ vaporizer, preheat, additives	1
Oxidation chamber	1
$TiCl_4$ quench, cyclones, bag filter	1
Chlorine recovery	1
After treatment	4
Bagging, warehouse	2
Oxygen plant	1
Total	17

Supervisors	
Chlorination, purification	1
Oxidation	1
After treatment	1
Total	3

TABLE 25

TiO_2 PIGMENT PROFITABILITY--CHLORIDE PROCESS

Investment: $21,330,000
Manufacturing Cost: $0.227/Lb.

Pigment Selling Price	(Rutile Grade) $0.275/Lb.
Gross Profit/Lb.	0.048
Gross Profit/Ton	96.00
Freight at 5% of List Price Sales/Ton	27.50
General, Selling, & Administrative @ 7.5% of List Price Sales/Ton	41.25
Profit Before Taxes/Ton	27.25
Profit After Taxes/Ton	13.625
Profit After Taxes as % of Sales	2.5

CASH FLOW

Profit After Taxes/Ton	13.62
Plus Depreciation/Ton	77.63
Total Cash Flow/Ton	91.25
Total Cash Flow @ 25,000 Tons	2,281,375
Investment	21,330,000
Working Capital (3 months' operating costs)	2,837,500
	24,167,500
Payback (Yrs)	10.6
% Return on Capital Employed	11.7

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supply has been filled by increased production in Australia and Norway. Present reserves of ilmenite are such that, at the present annual world consumption rate of nearly three million tons, adequate supplies of sufficient quality ore should be available for nearly 100 years.

The rutile ore supply situation, however, is not so bright. Rutile production in recent years has remained constant at slightly over 400,000 tons and is confined almost exclusively to the east coast of Australia. Significant deposits are believed available in Sierra Leone, but technical problems have hampered attempts to exploit this source. There is no rutile ore mined in the U.S. A large increase in worldwide chloride pigment process capacity has greatly increased demand, and present rutile reserves are estimated to be barely 20 years. These conditions have fostered a rise in rutile ore price from $100 per ton in 1965 to $180 per ton presently.

A major hope in the bleak rutile supply situation is the commercialization of synthetic rutile production. This process involves chemical leaching of ilmenite ore to remove iron impurities and to upgrade the TiO_2 content to approximately 90%. Since nearly two tons of ilmenite are required to produce one ton of synthetic rutile, waste disposal considerations will adversely affect the rapid development of domestically available synthetic rutile, although both Sherwin-Williams and Kerr McGee are actively pursuing this technology. Semi-commercial synthetic plants are in operation in Australia and Japan, and the product has been tested and found acceptable in most U.S. chloride process pigment plants. Chloride producers anticipate that synthetic rutile will begin to appear commercially by 1975 at $130-150 per ton and feel that this material will be significant in keeping chloride pigment production economically viable.

The other significant factor in chloride process raw materials has been the development of Du Pont's ability to utilize ilmenite ore in its chloride plants. Although this capability has always been technically feasible, it has been uneconomic due to the high chlorine loss resulting from chlorinating the 40% of iron oxide present in ilmenite. Du Pont, however, has developed the ability to minimize chlorine use and is able to produce chloride pigment for an estimated 1-2¢ per pound less than rutile-based chloride processes. Since ilmenite is much more widely available than rutile, other chloride producers are working on both ilmenite beneficiation technology and direct ilmenite use capability in chloride processing. Thus far, however, Du Pont remains the only producer using ilmenite directly.

The last major source of TiO_2 is titanium slag, which is produced in Canada from plentiful, low-quality ilmenite ores. The ilmenite used here is closely intermixed with iron ores, and smelting is employed to produce pig iron and titanium slag containing 70% to 72% TiO_2. Slag cannot be used in the chloride process due to the formation of insoluble chloride salts which plug up processing equipment. While other raw materials such as chlorine, coke, and sulfuric acid are used in

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TiO_2 pigment production, these items are widely available and do not constrain the production process to the degree that TiO_2 ores do.

4. Supply/Demand Balance; Prices

Industry capacity has been sufficient to supply demand as almost continual additions to capacity have been made. Table 26 summarizes capacity and production figures for recent years and shows that capacity utilization has been in the 75% to 85% range. Capacity has been taken at announced, or nameplate, levels and is higher than effective capacity due to grade/product mix constraints. The industry is now facing a tight-supply situation with NL Industries announcing the closing of its chloride facilities in Sayreville, New Jersey. Du Pont's announced expansions won't be operational until year-end 1973.

This supply situation is substantially different from that of 1970-71 when over-supply forced a sharp depression in prices. Table 27 summarizes recent shipment valuation history and confirms industry claims that the 1970-71 period saw severe price competition, despite stable list prices. Demand and prices have improved with the economic recovery and recent list prices stand at: standard anatase and rutile grades, bulk--28.5¢ per pound; paper grade anatase--24¢ per pound. Most producers are running at full capacity presently, and shipments are being made at list prices.

TABLE 26

TiO_2 INDUSTRY PLANT CAPACITY UTILIZATION
(Thousands of Tons)

	Capacity	Production	Percent Utilization
1965	713	576.7	81
1966	725	594.5	82
1967	766	589.4	77
1968	746	623.7	84
1969	778	664.3	85
1970	817	655.3	81
1971	805	677.8	84
1972	817	687.3	84

Sources: Chemical Economics Handbook and Current Industrial Reports.

TABLE 27

TiO_2 COMMERCIAL SHIPMENT VALUES

(Shipments in Thousands of Tons)

	Commercial Shipments	Total Value[1]	Value/Lb.[2]	List Prices[3] Anatase	List Prices[3] Rutile
1965	524.5	274.7	.261	.25	.26
1966	545.4	279.7	.256	.25	.26
1967	542.6	277.2	.255	.25	.26
1968	564.4	288.8	.256	.25	.26
1969	590.1	301.1	.255	.26	.27
1970	560.9	277.8	.248	.26	.27
1971	581.2	262.4	.226	.26	.26

[1]Value in \$ Millions.
[2]Value in \$ per Pound.
[3]Carlot, \$ per Pound.

Source: Current Industrial Reports, U.S. Department of Commerce.

D. SODIUM CHROMATE AND BICHROMATE

1. Summary

The U.S. sodium bichromate market has been characterized by essentially static demand during the past five years at approximately 150,000 tons annually. The market outlook for the next five years is for a slight overall contraction in demand with deteriorating markets in water treating and textiles (resulting from more stringent water quality standards) only partially offset by modest demand growth for chromic acid, chrome colors and catalyst applications. Very nearly half of current demand for sodium bichromate is for chrome colors and chromic acid. Other uses include leather tanning, metal treating, textiles, water treating and catalyst manufacture. Substitute products (or processes) exist for most bichromate derivatives, constraining demand growth.

There are currently three producers of sodium chromate and bichromate--Allied Chemical, Diamond Shamrock and PPG Industries. Aggregate captive requirements of these three companies approximate 35% of current production. U.S. producers of sodium bichromate are dependent on foreign sources, primarily the Republic of South Africa, for chromite ore, the basic raw material.

Manufacturing costs are estimated at \$212 per ton. Assuming GS&A at 5.5% of sales and a weighted average selling price of \$262 per ton (including some chrome salt cake by-product credit), the industry after-tax income in 1972 approximated \$18.50 per ton, equivalent to a 7.1% return on sales.

During the period 1960-1971, actual prices (as calculated from Commerce Department data for dollar values and tonnages) received by the industry have remained in a remarkably narrow range between \$240 and \$255 per ton. Although confirming Commerce Department data are not yet available, list price increases made recently probably have been reflected in somewhat higher plant prices. These price increases are believed to have been made possible primarily as a result of a somewhat less aggressive posture by foreign production sources, notably Italy and Japan. Producers in both these countries are understood to be facing higher manufacturing costs as a result of more stringent water pollution abatement standards. Nonetheless, imports have exceeded exports in seven of the last ten years.

2. Market Characterization

In Table 28 is shown the apparent U.S. consumption of sodium chromate and bichromate for the period 1960 through 1972. For most of this period, U.S. production, as reported by the Department of Commerce, has varied between 135 and 155 thousand tons annually. As indicated, these data include both sodium chromate and sodium bichromate. While some of the sodium chromate produced in the initial phase of the manufacturing process is marketed as such (an estimated 15 thousand tons of bichromate equivalent), most of the sodium chromate filtrate is further processed to produce sodium bichromate.

Imports, primarily from the U.S.S.R. and Japan in 1972, have varied in the last several years between 3.5 and 6.5 thousand tons. The sharp drop in imports from 1966 to 1967 reflected decreased U.S. demand. As a result of the Kennedy round agreements, the import rate of duty was reduced to $0.87 per pound as of January 1, 1972.

Exports, primarily to Canada, have trailed imports in recent years. In 1972 exports totaled 4.03 thousand tons valued at $0.93 million. Canada received the bulk (70%) of 1972 exports, with Colombia next at very nearly 20%. For purposes of estimating apparent consumption, we have ignored changes in stocks of chromium chemicals at producer plants.

On a long-term basis (in the post-World War II period), apparent U.S. consumption of sodium chromate and sodium bichromate has increased at an average annual compound rate of 2.4% per year. In each of the last three years, however, consumption has declined; the outlook is for a continuation of the recent trend.

a. Uses

In Table 29 is shown the estimated 1971 use pattern for sodium chromate and bichromate. Very nearly 50% is consumed in the manufacture of chrome colors and chromic acid. In descending order of bichromate consumption, the most important chromate colors are chrome yellow and orange, chromium oxide green, molybdate orange, and zinc yellow and chrome green. Production of chromium pigments in 1971 and the estimated bichromate equivalent requirements is shown in Table 30. Requirements for U.S. sodium bichromate in pigment production would have been higher were it not for the substantial imports of chrome colors. Imports of chromium-containing pigments in 1971 included chromium yellow, 6.2 thousand tons; chromium oxide green, 0.9 thousand tons; chrome green, 0.3 thousand tons; zinc yellow 1.08 thousand tons; and molybdate orange, 0.3 thousand tons. Total value of these products and miscellaneous other chrome colors was $4.5 million, 17% higher than in 1970.

A major use for chrome yellow is the yellow center strip line for highways. Chromium oxide green is used where chemical and heat resistance is required, e.g., in ceramic colors, for coloring cement and in green asphalt roofing. Zinc yellow finds application as a corrosion inhibitor

TABLE 28

APPARENT U.S. CONSUMPTION OF SODIUM CHROMATE AND BICHROMATE
(Thousands of Short Tons, $Na_2Cr_2O_7 \cdot 2H_2O$)

Year	Production	Imports	Exports	Apparent Consumption
1960	121.9	1.9	9.6	114.2
1961	120.9	1.6	7.1	115.4
1962	127.5	2.5	5.0	125.0
1963	133.9	3.5	5.1	132.3
1964	137.9	3.4	6.7	134.6
1965	141.0	18.0	4.0	155.0
1966	141.5	24.1	2.6	163.0
1967	135.3	8.2	3.3	140.2
1968	146.0	11.6	4.8	152.8
1969	152.6	6.5	5.1	154.0
1970	153.5	3.6	4.9	152.2
1971	138.2	6.4	3.1	141.5
1972	137.1	5.7	4.0	138.8

Source: U.S. Department of Commerce.

TABLE 29

ESTIMATED 1971 USE PATTERN FOR SODIUM CHROMATE AND BICHROMATE
(Thousands of Tons)

End-Use	Consumption
Pigments	36.2
Chromic acid	32.0
Leather tanning	28.0
Metal treating	16.2
Textiles and dyes	10.1
Miscellaneous	19.0
Total	141.5

Source: Contractor's estimates.

TABLE 30

PRODUCTION OF CHROMIUM PIGMENTS AND CONSUMPTION OF SODIUM BICHROMATE EQUIVALENT, 1971
(Thousands of Tons)

Pigment	Production	Consumption of Bichromate Equivalent
Yellow and Orange	29.0	14.8
Oxide Green	6.6	9.0
Molybdate Orange	11.4	5.9
Zinc Yellow	5.6	5.8
Chrome Green	2.7	0.7
	55.3	36.2

Source: U.S. Department of Commerce and Contractor's estimates.

for light metals and steel. For example, in combination with red lead it is used in priming structural steel. It also is part of the formulation for automotive body prime coats. Sodium bichromate-based pigments are also used in printing inks and plastics.

The second largest outlet for sodium bichromate is for the manufacture of chromic acid, produced by reacting concentrated sulfuric acid with sodium bichromate. Chromic acid, in turn, is used primarily in chrome plating processes but also finds use in copper stripping, aluminum anodizing and for general corrosion prevention. The automotive industry represents the major user for chrome plating, although other durable goods manufacturing such as appliances also have requirements. Chromic acid imports have constrained domestic production.

The third most important outlet for sodium bichromate is leather tanning. With the exception of heavy cattle hides, where vegetable tanning is used, chrome tanning is the most important treatment for all hides (i.e., calfskins, goat- and kidskins, sheep- and lambskins). Chrome tannage is used in shoe uppers, glove leathers, garment leathers, and bag leather. In the tanning process, sodium bichromate is reduced with glucose to make the solutions of chromium salts employed in chrome leather tanning.

Various metal treating and finishing processes are the next most important outlet for sodium bichromate. For example, a solution of sodium bichromate and sulfuric acid is used in the bright dipping of brass and copper to remove oxide scale. Another important use in metal finishing is in the formation of chemical conversion coatings to provide corrosion protection and decorative effects, as well as to provide a good base for painting metal surfaces.

In the textile industry, sodium bichromate is used in a variety of ways. For example, among its applications are mordanting of wool, dyeing nylon and wool, dyeing with chromate colors, as an after-treatment on cotton to retard fading of dyes during washing and for stripdyed wool.

A miscellaneous category of uses, including chemical applications, wood preservative applications and corrosion control, accounted for approximately 13% of U.S. sodium bichromate consumption in 1971. A small quantity of sodium bichromate is used in the oxidation of various organic chemicals, including pharmaceuticals. The bleaching of fats, oils, and waxes also requires use of the bichromate as an oxidant. Perhaps the major chemical use for sodium bichromate is in the manufacture of catalysts. Chromates and bichromates are an important ingredient in the preservatives and fire retardants used by the wood preserving industry. Chromates are also used to inhibit corrosion in recirculating water-based systems (e.g., in cooling towers and large central air conditioning facilities).

b. Substitute Products

The primary substitution effect is represented by alternate materials (or processes) for derivatives of sodium bichromate rather than for the bichromate per se. As an example, aluminum or high-impact plastics can be substituted for chrome plated trim on motor vehicles. (It should be noted that processes have been developed to chrome plate plastics, e.g., ABS, although uncoated plastics are also used in automobile trim.) As another example, cadmium yellow can be used in place of chrome yellow pigments. Market growth for chrome leather is limited by lower cost substitutes, specifically, the poromeric materials. Tin-free steel cans coated with chrome compete with aluminum cans and seamless, deep-drawn steel cans coated with tin. The existence of these alternate materials both limits market growth and represents a constraint on higher sodium bichromate prices.

c. Captive Requirements

Table 31 presents Commerce Department data for sodium chromate and bichromate production, shipments, and shipment value for the period 1960 to 1971. Excluding inventory fluctuations and losses, the difference between total production in any given year and the quantity of shipments reflects the amount of sodium bichromate consumed at the producing plants for derivative manufacture. In recent years, this has amounted to about 50,000 tons or approximately 33% of total production. Including inter-plant transfers, captive consumption by the industry approximates 35% of production.

3. Supply Characterization

a. Manufacturing Routes and Economics

Sodium chromate and bichromate are made by calcining chrome ore (chromite) with soda ash or with soda ash and lime. More specifically, sodium chromate is manufactured by calcining a mixture of chromite ore, lime, and soda ash. The sodium chromate, if desired, can be recovered by leaching and crystallization. Sodium bichromate is produced by treating a sodium chromate solution with sulfuric acid. Sodium bichromate and the sodium sulfate by-product produced are separated and recovered by crystallization. Sodium bichromate is the principal commercial product because it is usually priced to cost less per unit of CrO_3 than sodium chromate.

As indicated, chromium chemicals are produced from chromite ore, the term chromite being a general one used to designate chromium-bearing spinel. The composition of chromite varies widely, usually with inclusions of magnesia, alumina, and silica. Although distinctions are not clearcut, there are three broad grades of chromite--high chromium chromite, a metallurgical grade; high-iron chromite, which is the chemical grade; and high-aluminum chromite, the refractory grade. Chromite

TABLE 31

SHIPMENTS OF SODIUM CHROMATE AND BICHROMATE

Year	Production (M Tons)	Shipments* Quantity (M Tons)	Shipments* Value ($ MM)	Shipments* Unit Value ($/Ton)
1960	121.9	89.1	22.7	254.77
1961	120.9	85.2	20.5	240.61
1962	127.5	97.0	24.8	255.67
1963	133.9	88.2	21.2	240.36
1964	137.9	99.6	22.9	239.92
1965	141.0	103.7	24.2	233.37
1966	141.5	94.2	23.9	253.72
1967	135.3	94.0	23.0	244.68
1968	146.1	100.0	23.9	239.00
1969	152.6	97.5	23.1	236.92
1970	153.5	103.2	24.8	240.31
1971	138.2	88.2	21.9	248.30

*Including interplant transfers.

Source: U.S. Department of Commerce.

has not been mined in the U.S. since 1961, when a small tonnage was produced under the government's Defense Production Act. With the exception of government stockpile releases, U.S. producers of chromium chemicals are therefore dependent on foreign sources. No commercially feasible process for upgrading domestic chromite bearing materials to compete with foreign ores has been developed.

Most of the known world reserves are located in the Republic of South Africa and Southern Rhodesia. The embargo on chromite from Southern Rhodesia, brought about by United Nations action in 1966 and an Executive Order in 1967, resulted in the U.S. turning to the U.S.S.R. for some of its chromite requirements. Most of the chemical grade chromite, however, comes from the Republic of South Africa.

Estimated manufacturing costs for sodium bichromate are shown in Table 32. The manufacturing cost estimates are based on a plant with 150 tons per day capacity and an investment (assuming the plant was built in 1960) of $5.7 million. The indicated manufacturing cost is $212. Included in this total is the cost of producing by-product sodium sulfate, amounting to approximately $20 per ton of bichromate.

Assuming a 1972 selling price for sodium bichromate of $245 per ton, plus by-product credit for 0.8 tons of sodium sulfate valued at $17, the total unit sales value is $262. Taking GS&A at 5.5% of sales, the indicated after-tax profit is $18.50 per ton for an after-tax return on sales of 7.1%.

b. Supply/Demand Balance

The producers of sodium bichromate are shown on Table 33. The two largest producers, Allied Chemical and Diamond Shamrock, have heavily integrated positions, both with respect to raw materials and derivative products. For example, Allied is a major producer of soda ash and sulfuric acid, and, along with Diamond Shamrock, is a major producer of chromic acid. Similarly, Diamond Shamrock produces both soda ash and sulfuric acid and several other derivatives of sodium bichromate in addition to chromic acid. PPG Industries produces soda ash at Corpus Christi and has nominal captive outlets for the sodium bichromate in pigments. Hercules, Inc., had produced bichromate in a small (approximately 30 tons per day) plant in Glens Falls, N.Y., for captive consumption in pigment manufacture. This facility has been closed.

The newest facility of the three producing plants is Diamond Shamrock's. Diamond Shamrock brought its Castle Hayne, North Carolina, facility on-stream late in 1971. The new plant replaced two older, less efficient plants at Painesville, Ohio, and Kearny, New Jersey. Including Diamond's new facility, total industry capacity is estimated at 175,000 tons per year. Compared with reported production of 137-138,000 tons per year, the industry operating rate in both 1971 and 1972 was slightly under 80%.

TABLE 32

ESTIMATED MANUFACTURING COST, SODIUM BICHROMATE

Production: 150 Tons/Day sodium bichromate
Operation: 330 operating days
Investment: $5,700,000 (Assuming plant was built in 1960)

Item	Units	US$/Unit	Units/Ton	Cost (US$/Ton Product)
Raw Materials				
Chromite (44% Cr_2O_3)	short ton	19.00	1.30	24.60
Soda Ash (Na_2CO_3)	100 lb	2.40	17.00	40.80
Lime (CaO)	short ton	20.50	0.80	16.40
Sulfuric Acid (66°Be)	short ton	26.00	0.50	13.00
Utilities				
Power	MKwh	15.00	0.50	7.50
Fuel	MMBtu	0.70	40.00	28.00
Water	MGal	0.10	14.00	1.40
Direct Labor				
Supervisors	Man-hr	7.50	0.17	1.30
Operators	Man-hr	5.00	3.40	17.00
Helpers	Man-hr	3.75	6.00	22.50
Overhead	60% Direct Labor			24.48
Maintenance				5.50
Maintenance Supplies				4.00
Depreciation	(3.0% of investment)			3.52
Taxes and Insurance	(1.3% of investment)			1.50
		Total Manufacturing Cost		211.50

Source: Contractor's estimates.

TABLE 32 (Continued)

MANUFACTURING COSTS FOR BY-PRODUCT Na_2SO_4

	Units	US$/Unit	Units/Ton	US$/Ton
Utilities				
Power	MKwh	15.00	0.10	1.50
Water	MGal	0.10	30.00	3.00
Direct Labor				
Supervisor	Man-hr	7.50	0.30	2.20
	Man-hr	5.00	1.00	5.00
	Man-hr	3.75	2.00	7.50
Maintenance Supplies	(0.4% of total investment)			0.50
Maintenance Labor	(0.2% of total investment)			0.20
Tax and Insurance	(0.1% of total investment)			0.10
				20.00

Source: Contractor's estimates.

TABLE 33

CURRENT PRODUCERS OF SODIUM BICHROMATE
(Thousands of Tons Hydrous Sodium Bichromate Equivalent)

Company	Location	Capacity
Allied Chemical Corp.	Baltimore, Md.	75
Diamond Shamrock Corp.	Castle Hayne, N.C.	70
PPG Industries, Inc.	Corpus Christi, Tex.	30
Total		175

Source: Trade sources.

4. Prices

A comparison of list prices versus actual prices as calculated from the Commerce Department data on reported value and quantity of shipments is shown in Table 34. Throughout the period, actual unit values realized by producers have been less than list prices. For example, in 1971 the actual price was 12.4 cents per pound versus a list price of 16.0 cents per pound.

List prices were increased by approximately 1 cent per pound in 1973 as they were in 1970 and 1971. Although shipment values for the industry for 1972 are not yet available from Commerce Department, actual prices received by producers are believed to have declined slightly. We have assumed an average industry plant price of $245 per ton in 1972 for our profitability estimates.

For the period shown, actual prices have varied very little. The static price pattern reflects low demand growth, competition from imports, the availability of substitute materials for derivative products, and an over-capacity situation in the industry. Static plant prices have been offset somewhat during this period by declining costs for the chromite ore. Bichromate producers are believed to have written favorable, long-term contracts for chromite ore. These contracts, however, will be phasing out over the next several years. Renegotiations will probably be at higher levels, reflecting both increased ore costs and higher ocean freights.

TABLE 34

ACTUAL VS. LIST PRICES FOR SODIUM BICHROMATE
(Cents per Pound)

Year	List Price[1]	Actual Price[2]
1960	13.00	12.74
1961	13.00	12.03
1962	13.00	12.78
1963	13.00	12.02
1964	13.00	12.00
1965	13.00	11.67
1966	14.00	12.69
1967	14.00	12.23
1968	14.00	11.95
1969	14.00	11.85
1970	15.00	12.02
1971	16.00	12.42
1972	16.00	Not available
1973	17.25	Not available

[1]Granular, bags, carlots, truckloads, works.

[2]Calculated from U.S. Department of Commerce reported value and quantity of shipments.

E. POTASSIUM CHROMATE AND BICHROMATE

While sodium chromate and sodium bichromate are by far the major chromium chemicals, a number of other chromium compounds are also produced from chromite ore. These secondary chromium chemicals include potassium chromate and potassium bichromate, ammonium bichromate, and chromium potassium sulfate. There are no government data for any of these materials on an individual basis. Commerce Department does report on an annual basis the dollar value of shipments for "other chromium compounds." In 1971, the most recent year for which data are available, the shipments of other chromium compounds were valued, f.o.b. plant, at $9.5 million. This dollar total has varied between $9.5 and $10.5 million for the last five reporting years.

Although potassium chromate and bichromate are the most important of the secondary chemicals, production of the potassium compounds in the U.S. only totals 3,000 tons annually. There are a variety of miscellaneous uses for potassium chromate and bichromate, the most important of which are pigments and reagent grade materials. Allied is the only U.S. producer of importance.

Potassium chromate and bichromate can be made by a process similar to that for producing sodium bichromate by substituting potassium carbonate for sodium carbonate in the raw material mix. However, potassium bichromate is normally made from sodium bichromate and potassium chloride. Estimated manufacturing costs for potassium bichromate are shown in Table 35. The sodium bichromate has been charged into the potassium bichromate process essentially at manufacturing cost. As indicated, total manufacturing costs were estimated at $402.75 per ton. Assuming plant netback at $475 per ton (the list price for potassium bichromate is 24¢ per pound) and GS&A at 5% of sales, the after-tax profit per ton is $24 per ton. This would be equivalent to an after-tax return on sales of 5.0%.

TABLE 35

ESTIMATED MANUFACTURING COST, POTASSIUM BICHROMATE

Production: 15 Tons/Day of Potassium Dichromate
Operation: 330 Working Days
Investment: $2,400,000 (Estimated)

Item	Units	US$/Unit	Units/Ton	Cost (US$/Ton Product)
Raw Materials				
Sodium Bichromate (content in solution)	ton	212	1.2	254.40
Potassium Chloride	ton	35	0.7	24.50
Utilities				
Power	MKwh	15	0.3	4.50
Fuel	MMBtu	0.7	15	10.50
Water	MGal	0.1	10	1.00
Direct Labor				
Supervisors	man-hr	7.50	0.6	4.45
Operators	man-hr	5.00	3	15.00
Helpers	man-hr	3.75	3	11.25
Overhead	(100% Direct Labor)			30.00
Maintenance Labor				4.00
Maintenance Materials				4.00
Depreciation	(6.5% of Investment)			31.95
Tax and Insurance	(1-1/2% of Investment)			7.20
		Total Manufacturing Cost		402.75

III. IMPACT ANALYSIS--INITIAL STUDY PRODUCTS

A. ALUMINUM CHLORIDE

1. Treatment Costs

As developed in the Development Document, water treatment costs for aluminum chloride producers total $3.77 annually per ton of product for E.P.P., B.P.T., and B.A.T. This amount would apply to plants operating on a chlorine-rich basis to produce yellow aluminum chloride, which is preferred for the manufacture of some dye and pigment intermediates.

Aluminum chloride plants operating on either a stoichiometric or aluminum-rich basis would have less waste chlorine stack gas and therefore lower pollution abatement costs. At least one producer is able to manufacture and sell 28% aqueous aluminum chloride solution derived from its scrubber effluents.

2. Price Impact

The maximum treatment cost of $3.77 per ton represents approximately 1.3% of the current selling price of aluminum chloride. Further, it is estimated that it will cost an additional 0.4% of the current selling price to concentrate the dilute scrubber solution for yellow aluminum chloride. Although capacity utilization (at about 65%), captive usage, and demand growth are relatively low, and therefore act as price increase constraints, these factors are outweighed by the low level of foreign competition, the absence of substitute products, and the existence of only a few products all with equal treatment costs. (All producers of yellow aluminum chloride will be faced with approximately the same water effluent charges.) Some level of price increase is therefore possible, and producers of aluminum chloride should be able to cover at least part of their added treatment costs. Any costs which could not be passed on as a price increase would have to be absorbed by the manufacturers.

3. Plant Shutdown Impact

No plant shutdowns are expected as a direct result of additional water pollution abatement costs. Given the moderate degree of integration, the fact that plants with a water pollution problem will have already made a large investment in air pollution abatement equipment, and a relatively high emotional commitment on the part of the aluminum chloride producers, the very low level of added cost for water treatment is too small to result in plant shutdowns.

B. ALUMINUM SULFATE

1. Treatment Costs

Water treatment costs for nonexemplary aluminum sulfate plants are estimated to be $0.93 per ton of product above existing B.L.P. treatment, or $1.72 per ton total. This added cost will raise average treatment level to zero discharge of process or cooling water effluent, which in this case is equivalent to E.P.P. Additional investment for a 40 ton-per-day plant is estimated to be $60,000.

The treatment process which will effect zero discharge involves clarification and additional pond settling of mud and digestion wastes, followed by recycle of process water. Depreciation and operating costs exclusive of power account for 46% and 23% respectively of total treatment costs.

2. Price Impact

Since there are no suitable substitute products, foreign competition is minimal, and market share is concentrated among several producers, water treatment costs will probably be passed on as small price increases. The amount of the increases, however, will vary with each producer's local competitive situation. Although before-tax treatment costs are small relative to product price, the cost per ton of product is highly dependent on plant capacity, which varies from 5,000 to 70,000 tons per year for individual facilities. Such a disparity in capacity will enable the large producer to cover his unit treatment costs with a smaller price increase than the small producer will require.

The nature of the aluminum sulfate market, however, will probably allow most smaller producers to continue operations at reduced profit levels. Many small plants have been located near paper mills in order to supply aqueous aluminum sulfate economically for paper manufacture. Despite higher unit production costs, a smaller plant can supply at a lower delivered cost than a larger, more distant plant can, due to the cost of transporting water solution. Aluminum sulfate is sold dried and bagged only where plants and customers are widely scattered, and the product must be transported long distances. It is anticipated, therefore, that larger producers will raise prices to cover their increased costs as fully as possible. Smaller producers will probably raise prices only to the point where they can still marginally undersell their larger, more distant competitors--a point which most likely will not permit the small producer to fully recover his costs, but which will allow continued operation at lower profitability. In any case, it is not expected that prices need be raised more than 5% due to water treatment costs.

3. Plant Shutdown Impact

Recent years have seen the closing of some small plants and a trend toward larger, more efficient facilities. As demand for aluminum

sulfate as a water treatment chemical increases, the trend toward larger plants should continue. A large scale shutdown of small aluminum sulfate facilities, however, is not expected to occur as the result of anticipated increases in water treatment costs.

A very few marginally profitable plants may shut down, but these plants probably would have shut down anyway as a result of competition from larger plants. These occurrences will most likely be limited to situations in which a small plant cannot raise prices enough to remain profitable, while still underselling a larger, more distant competitor, and added water treatment costs represent the final negative factor against continued operation.

Industry capacity should continue to be sufficient to supply demand, and no increase in imports, with accompanying detrimental effects on balance of payments, is anticipated.

C. CHLORINE AND CAUSTIC SODA

1. Treatment Costs

As estimated in the Development Document, the cost of water treatment for a 175 ton-per-day mercury cell plant to achieve effluent conditions equivalent to B.L.P. is $2.14 per ton of chlorine produced. B.L.P. was defined in the Development Document as reduction of mercury to less than 0.5 pounds per day. For the exemplary plant investigated, the same investment, and therefore the same cost, was sufficient to reduce mercury to E.P.P. standards, i.e., less than 0.15 pounds per day. An incremental cost of $0.60 per ton of chlorine above E.P.P. was estimated for catalytic conversion of sodium hypochlorite to sodium chloride, bringing the mercury cell plant to B.P.T. control level. An incremental cost of $0.86 per ton above E.P.P. was estimated to achieve zero discharge (B.A.T.) and involved B.P.T. treatment plus evaporation and reuse of sodium chloride.

Similarly, the Development Document has estimated that the unit cost (in terms of chlorine) to achieve B.L.P. standards for a 2300 ton-per-day diaphragm cell plant is $0.038 per ton, the treatment being restricted to settling ponds. The incremental cost for this same plant over and above B.L.P. to achieve E.P.P. standards is $0.254 per ton of chlorine. This same unit cost is estimated to achieve B.P.T., but the assumption is made that there are no incremental operating costs associated with B.P.T. because hydrochloric acid recovered is assumed equal to cost. There is an incremental investment of $430,000 estimated above E.P.P. to cover the installation of the hydrochloric acid plant for the chlorine tail gas. Finally, the incremental unit cost above E.P.P. to utilize B.A.T. standards for this plant is estimated at $0.52 per ton of chlorine.

As a percent of the estimated $100.90 industry average revenue in 1972 per ECU (1.0 tons of chlorine plus 1.1 tons of caustic soda), the before-tax unit cost above B.L.P. and E.P.P. (which are equal) for the mercury cell plant is 0.59% for B.P.T. and 0.85% for B.A.T. The comparable ratio for the diaphragm cell plant is 0.25% for E.P.P. and B.P.T. and 0.52% for B.A.T. Compared to the average industry profit margin of $4.12 per ton for mercury cell plants (estimated in the initial study project) the incremental after-tax cost for B.P.T. in the mercury cell plant represents 7.3% of unit profits while B.A.T. represents 10.4% of industry profits. The comparable figures for the diaphragm cell plant (using $4.33 per ton as average unit profit) are 2.93% for both E.P.P. and B.P.T. and 6.03% for B.A.T.

2. Price Impact

Chlorine/caustic producers have the theoretical option of attempting to recover water treatment costs through price increases for chlorine and/or caustic soda. In our judgment, the opportunity for defraying some or all the water treatment costs through higher chlorine prices is better than via raising caustic soda prices. Both capacity utilization and captive usage are atypically high on average for chlorine. Demand growth is good (at 6% per year) and foreign competition is non-existent. Although there are a relatively large number of producing companies (approximately 30), the water pollution abatement costs faced by mercury plants are not significantly different than those for diaphragm plants. The difference is insufficient to put the mercury plants at a significant disadvantage if prices were to be raised only to cover the water treatment costs experienced by diaphragm cell plants.

More severe constraints exist for price increases in caustic soda. Except for periods of abnormally low chlorine demand (e.g., that experienced in the 1970-71 recession), caustic soda has usually presented a disposal problem to most chlor-alkali producers. Because normal caustic soda demand growth has been insufficient to match caustic soda supply (which, in turn, is a function of chlorine demand), the excess caustic has been sold in competition with other sodium alkalis, notably soda ash, at distressed price levels. We expect a long-term continuation of the caustic soda excess and therefore continued down-side pressure on caustic soda prices.

3. Plant Shutdown Impact

On the basis of the treatment costs estimated in the effluent guideline Development Document (and mentioned above), and based on the conclusion that most if not all of the nominal incremental costs for water treatment will be passed on through chlorine price increases, we foresee no plant shutdowns for producers who have already achieved B.L.P. However, an estimated 13% of the mercury cell plants have not yet made this investment. Instead of the $0.86 per ton incremental costs mentioned above to reach B.A.T., these producers would be faced with a $3.00 per ton cost. Some of these producers, assuming that they tend to be marginal plants, but probably no more than 5% of the industry (one or two plants), would be subject to shutdown.

D. HYDROCHLORIC ACID

1. Treatment Costs

Treatment costs have been supplied for the chlorine burning process only, a method which accounts for at most 12% of total U.S. hydrochloric acid production. For a 40 ton-per-day chlorine-burning facility the total cost to apply B.A.T. is $0.30 per ton of product (100% HCl), and the incremental cost above B.L.P. is $0.05 per ton. The treatment process involves neutralization of weak acid effluent which is generated only during plant startup. According to the effluent guideline Development Document there is no steady-state waterborne effluent.

Additional investment required for B.A.T. for the 40 ton-per-day plant is only $5,000. Depreciation and operating costs exclusive of power account for 35% and 47% respectively of the total annual treatment cost of $4,250.

By-product production of hydrochloric acid from hydrocarbon chlorination (which accounts for 88% of total production) was not covered in the effluent guideline Development Document. The effluent guideline Development Document indicated, however, that there are no water treatment costs directly attributable to by-product production.

2. Price Impact

Due to its overwhelming preponderance of production capacity, the by-product route controls hydrochloric acid supply and prices. By-product acid will not have to bear the direct water treatment costs which burning plant acid will; hence, it is not anticipated that the treatment costs incurred by a small industry segment will be passed on as general price increases. The likelihood of no increase is further supported by the presence of many producers holding fragmented market shares and the fact that, despite a recent trend toward a more balanced supply/demand situation, production has exceeded consumption by as much as 32% since 1961. This situation has been brought about by by-product acid supply being a function not of hydrochloric acid demand, but of the non-related demand for chlorinated hydrocarbons and has had a strongly depressing effect on hydrochloric acid prices. The decreasingly small portion of the industry which is faced with water treatment costs, therefore, will be hard pressed to seek relief in the form of price increases and will be forced to absorb these costs.

3. Plant Shutdown Impact

Only those direct producers not in a chlor-alkali complex face the possibility of plant shutdown as the result of water treatment costs. The weak acid waste stream from direct production in a complex can be used to neutralize caustic waste from other parts of the complex, and the producer essentially incurs no waste treatment cost on hydrochloric acid.

There is only one known isolated, direct burning plant in the country, and it is located near a larger chlor-alkali complex which provides a readily available site for waste acid disposal at nominal cost. The fact that there are no direct burning hydrochloric acid plants unable to dispose of water wastes at nominal cost leads us to conclude, therefore, that water treatment costs will not directly result in shutdowns of direct-burning hydrochloric acid plants.

E. HYDROFLUORIC ACID

1. Treatment Costs

As estimated in the effluent guideline Development Document, total treatment costs for a 40 ton-per-day hydrofluoric acid plant to achieve E.P.P., B.P.T. and B.A.T. are $4.04, $4.89 and $12.95 per ton, respectively. Costs for B.L.P. were estimated at $3.57 per ton. Annualized costs to to bring the industry to E.P.P., B.P.T. and B.A.T., respectively, from B.L.P. therefore would amount to $0.47, $1.32, and $9.38 per ton. As a percent of the estimated average industry's 1972 selling price of $370 per ton, the annualized treatment costs for E.P.P., B.P.T. and B.A.T. would be 0.13%, 0.36% and 2.54%, respectively.

The initial study project suggested a range for after-tax profitability on sales of 4% to 10%. Taking 5% as average, the after-tax profit margin on a $370 netback price would be $18.50 per ton. The after-tax treatment cost as a percent of this profit margin for E.P.P., B.P.T. and B.A.T. is 1.30%, 3.57% and 25.4%, respectively. New investment in treatment facilities for E.P.P., B.P.T. and B.A.T. as a percent of net fixed plant investment is 0.60%, 1.00% and 1.50%, respectively.

2. Price Impact

Conditions in the hydrofluoric acid industry are such that price increase constraints are low. Specifically, there are no economically viable substitute products for hydrofluoric acid in its major end-use applications. Captive usage is exceptionally high at about 75% of current consumption. Similarly, plant utilization is high at nearly 85% of the 392,000 tons of in-place capacity at the end of 1972. Demand growth is strong at 5% to 7% per year. Imports have been negligible so that there has been no threat of foreign competition. (Imports of hydrofluoric acid from Mexico will very probably increase in the future, however. Four U.S. companies have announced plans to build acid plants in that country with the apparent intent--initially at least--of using the acid captively for U.S. derivatives manufacture. There is the long-term possibility that increased pressure will be brought to bear by Mexico for manufacture of the derivatives of hydrofluoric acid in Mexico as well.) The price elasticity of demand for hydrofluoric acid is low. Market shares are relatively concentrated with two producers, Allied and Du Pont, accounting for more than 50% of capacity.

All of the foregoing considerations suggesting little or no constraint on price increases by far outweigh the two identified conditions tending to constrain price increases, viz. the relatively large number of producers (nine) and the fact that price is the primary basis for competition. Moreover, the magnitude of the price increase necessary to defray treatment costs even for B.A.T. (2.54% of the estimated industry selling price) is less than one-half cent per pound.

3. Plant Shutdown Impact

Since we have concluded that the industry would be able to pass on the treatment costs through price increases we must also conclude that there will be no plant shutdowns on the basis of the treatment costs provided us. The magnitude of these treatment costs on an after-tax basis as compared with industry profitability and cash flows and the magnitude of the treatment investment compared with net fixed investment for the industry support this conclusion. Moreover, industry conditions do not suggest the possibility of plant shutdowns. The industry is heavily integrated to downstream products (as inferred from the high captive usage), there are no overwhelming additional environmental costs to be defrayed and producers have an emotional commitment to the product.

F. HYDROGEN PEROXIDE

1. Treatment Costs

Based on the information developed for hydrogen peroxide in the effluent guideline Development Document, treatment costs to achieve B.A.T. are small relative to average selling price. For the electrolytic process, a process used by only one U.S. plant, the annual incremental treatment cost above E.P.P. and resulting in zero discharge would be approximately $0.39 per ton, or 0.07% of the current average selling price of about $596 per ton. The organic process, which is employed by five plants, leads to somewhat higher incremental costs for water pollution abatement. The incremental annual cost to achieve zero discharge via this process is $0.86 per ton. This added cost is also relatively small (0.14%) compared to the average selling price of hydrogen peroxide.

2. Price Impact

Although the potential impact on prices from water pollution abatement costs is small, producers of hydrogen peroxide may have difficulty in passing even these nominal costs on to customers through a price increase. The concentrated nature of the industry and the low level of substitute products are factors which would normally make it possible for producers to pass on increased costs, but the low level of capacity utilization (ca. 70%), low captive use (ca. 30%), some pressure on prices from foreign competitors, and differences in manufacturing costs due to plant size and processes used, are all factors which will make difficult any move to pass on the added treatment costs.

3. Plant Shutdown Impact

On the other hand, plant shutdowns as a direct result of such relatively small added water pollution abatement costs are also unlikely. The added costs may put some additional economic pressure on those producers whose plants are small and thus suffer diseconomies of scale. Additional plant shutdowns may occur as a result of normal economic forces, and thus smaller and/or older plants may be closed or placed on standby as capacity is adjusted to current demand.

There has been a trend in the industry to phase out the electrolytic plants, the economics of which are unfavorable compared to those operating by the organic process. The lower incremental cost for the electrolytic plant to achieve zero discharge may retard, rather than hasten, the decision to close this plant.

G. LIME

1. Treatment Costs

There are no waterborne wastes from the lime manufacturing process, and some plants (about 25% of the industry) have no waterborne wastes at all. According to the effluent guideline Development Document, those plants which do have waste-bearing water effluents are those which use wet scrubbing of gaseous effluent to remove entrained dust. While no costs were developed in the effluent guideline Development Document for wet scrubbing or treatment of scrubber effluents, the cost of installing a dry collection system (thereby avoiding waste-bearing water effluent) in a plant of 108,000 tons-per-year capacity was estimated at approximately $1.28 per ton annually. This cost of $1.28 per ton is taken as the maximum cost for zero discharge of waterborne wastes. It is recommended in the effluent guideline Development Document that water scrubbing and elimination of waterborne wastes be used whenever the total cost of such treatment is less than $1.28 per ton. One large plant plans to install a recovery system on the wet scrubber waste stream, the cost of which will be covered by product value obtained.

2. Price Impact

The annual treatment cost of $1.28 per ton for lime producers not currently using dry collection techniques represents a significant added cost relative to the average plant price for lime, which is approximately $16.00 per ton. A price increase of 8% would be required on lime produced at these plants to cover the maximum cost of water pollution abatement. Given a situation in which some lime producers will incur these costs while others will not, a price increase of this magnitude would only be tenable in a captive or quasi-captive situation in which a lime substitute (such as limestone in agricultural use) was not available, in which lime from another source could not be obtained at a lower (i.e., existing) price level, and in which the price increase could be passed on or absorbed by the lime consumer. In view

of the nature of the lime industry, the large number of plants widely scattered throughout the country, and the competitive nature of industries using lime, such a situation is unlikely. A more probable situation would be one in which a lime producer using dry collection techniques, and not faced with increased water pollution abatement costs, would supply lime, on a freight-equalized basis, which could be priced lower than that supplied by a lime producer currently equipped with wet scrubbers. In summary, depending on the local supply/demand balance, a few plants may be in a position to pass on nearly all of the added treatment cost, many others only a fraction of the additional cost, and still others will be unable to pass on any added cost at all. Chances for success of some attempt to raise prices by affected lime producers will be improved by currently high capacity utilization and by forecasts of future growth.

3. Plant Shutdown Impact

According to information developed in the effluent guideline Development Document approximately 25% of all lime plants are equipped for dry bag collection of particulates. It is also reported that recovery of product which would otherwise be lost offsets the annual pollution abatement cost. The remainder of the industry has plants which use wet scrubbing, electrostatic precipitation, or some other method of dust control. Of the plants using wet scrubbers, only those classified as commercial (as opposed to captive) plants have been identified in the initial study project. These plants represented approximately 25% of the commercial plants identified in the study, and are the plants most likely to be affected by the implementation of more rigorous standards for waterborne wastes.

Typical profitability levels in the lime industry are reported to be from 4% to 6% of average selling price. At approximately $16.00 per ton, this would mean a maximum after-tax profit per ton of slightly under $1.00. Thus, if none of the added cost could be passed on, a producer forced to absorb up to $0.64 per ton after tax for water pollution abatement, would be left with less than half his normal profit from the sale of lime. Such a cut in profit levels for some producers could be the determining factor in a plant shutdown decision.

On this basis, we would expect that from four to ten plants may be closed. Since average employment in the lime industry is 35 persons per plant, this number of plant closings would mean that from 140 to 280 persons could be displaced. Fortunately, most plants having wet scrubbers are located reasonably close to urban areas and therefore in areas with potential employment alternatives.

H. NITRIC ACID

1. Treatment Costs

As reported in the effluent guideline Development Document, there are no direct waterborne process wastes and usually no waterborne wastes from air pollution abatement procedures in nitric acid manufacturing.

However, minor contamination of aqueous plant effluent may result from leaks, spills, and washdowns. It is also reported that 95% of the industry plants are at B.L.P. and that an incremental annual cost of $0.22 per ton would be required to install B.A.T.

It should be pointed out that these treatment costs, as developed in the effluent guideline Development Document, apply only to producers of commercial grade nitric acid (up to 70% concentration), and that the costs do not cover treatment of waterborne wastes from ancillary (cooling tower and boiler blowdown) effluent streams. In addition, nitric acid water treatment costs were assumed to be the same as those for sulfuric acid, since nitric acid cost figures were not available.

2. Price Impact

Approximately 90% of U.S. nitric acid production is captively consumed; the remaining 10% is typically offered for sale at a considerable discount from list price through long-term negotiated contracts. Based on dollar value and tonnage of 1971 shipments and interplant transfers, as reported by the U.S. Department of Commerce, the average selling price for nitric acid was $67 per ton. The reported maximum treatment cost for nitric acid, at $0.22 per ton, is approximately 0.3% of this average selling price. With both relatively low capacity utilization (ca. 75%) and demand growth, and with price as the main basis for competition, an across-the-board price increase to cover full incremental treatment costs is unlikely. The ability of individual producers to raise prices will depend on the competitive situation within each local market. However, some plants will undoubtedly be forced to absorb most of the added water treatment cost.

3. Plant Shutdown Impact

While some nitric acid plants may be shut down over the next several years as a result of normal economic forces, it is unlikely that the impact of added water pollution abatement costs, as developed in the effluent guideline Development Document, will be a significant decision factor. Plant shutdown decisions will more likely be based on such factors as low local capacity utilization, technological obsolescence of older plants, and the much higher cost of air pollution abatement.

I. SULFURIC ACID

1. Treatment Costs

Water treatment costs were estimated for plants using both sulfur burning and refinery acid sludge, which together account for 82% of all sulfuric acid plants. B.A.T. costs for sulfur burning were estimated at $0.12 per ton of product and for sludge regeneration at $0.50 per ton in both cases as increments above B.L.P. costs. For a 140,000 ton-per-year sulfur burning plant water treatment facilities investment is

$110,000, representing 3% of existing net plant investment. A 262,000 ton sludge plant, however, would require an additional investment of $1.15 million or 45% of existing net plant investment. The burning plant's water treatment operating costs are estimated at $24,000 per year, of which two-thirds is depreciation, with no direct operating or power costs. The sludge plant, on the other hand, will incur annual costs of $197,500 for B.A.T., with depreciation accounting for $125,000 and operating costs exclusive of power amounting to only $10,000. The treatment process in both plants entails neutralization of weak acid and isolation and containment of suspended solids.

2. Price Impact

We believe that water treatment costs can be passed on as a price increase. The amount and conditions for increase, however, are different for the two types of plants covered. Sulfur burning plants, the majority of which produce acid for non-refinery use, should incur water treatment costs which amount to only 0.6% of present selling price. Since these plants are concurrently encountering substantial air pollution control costs, it is expected that the relatively nominal water treatment costs will be passed on as part of joint air/water pollution control costs. Exact amounts of price increases will be dependent on local competitive conditions and the total amount of joint treatment costs to be passed on.

Refinery sludge plants, however, are in a special situation in that they are performing a service primarily for petroleum refiners who have no economical alternative for waste acid disposal. One sludge acid plant frequently handles the acid sludge streams of several refinery complexes since it is not economical for any but the largest refineries to have their own acid plants. Due to the sludge plant's higher investment and operating costs, higher prices are artificially maintained to provide the sludge operator with a profit equivalent to burning plants. In addition to air pollution costs comparable to those of sulfur burning, it is anticipated, therefore, that all of the water treatment costs, which amount to 10% of current selling price, will be passed on to refiners as price increases. Only the largest refiners will have the option of constructing their own sludge plant rather than accept higher prices.

3. Plant Shutdown Impact

Plant shutdowns due to water treatment costs alone are unlikely except for some sludge plants. For most non-sludge plants water treatment costs are not of sufficient magnitude to be the direct cause for plant shutdown. Some refinery sludge plants (no more than three or four) however, may face shutdown as a result of two special situations. In addition to returning fresh acid to local refineries, most sludge plants sell regenerated acid to commercial markets with the percentage of commercial business ranging from 10% to 100%. Since sludge producers face higher water treatment costs, the occasional producer dependent on a large percentage of commercial demand will be at a competitive disadvantage to the sulfur burning producer. The sludge

producer must cover high fixed costs through high capacity utilization, a condition which could be difficult to maintain if competitive burning plants under-price the sludge manufacturer. Due to water treatment costs, therefore, a sludge producer may face reduced profitability in the commercial market, either through reduced sales margins or through smaller capacity utilization, sufficient to warrant shutdown.

The other problem facing the sludge producer is the possibility of a refinery switching to captive sludge acid regeneration. This action is not likely since only a few refineries are large enough to economically operate their own acid regeneration plants. In addition, multi-site refiners may be reluctant to antagnoize sludge producers by going to captive acid regeneration at one location while continuing to utilize the sludge converter at another site.

IV. IMPACT ANALYSIS--MAJOR STUDY PRODUCTS

A. CALCIUM CARBIDE

1. Treatment Costs

The calcium carbide manufacturing process has no direct waterborne wastes, the only sources of effluent contamination being cooling tower blowdown and ion exchange requirements. One producer of calcium carbide uses the dry bag collection technique for air pollution abatement and has no significant water pollution abatement costs. The value of material recovered affects treatment costs in this case. Another producer, not yet having installed air pollution abatement equipment, is understood to be considering the dry bag approach.

The remaining two producers of calcium carbide, using water scrubbing for air pollution abatement, and representing approximately 85% of industry capacity, would have to isolate the scrubber effluent, remove suspended solids, and further treat the water before discharge. The annual operating expenses for such a scrubber effluent system are sufficiently large relative to after tax net income to make installation of a dry bag collection system--which, according to the effluent guideline Development Document, pays for itself from collection and recycling of raw materials and product--attractive even to those producers who have already installed scrubbers. For a small (50,000 ton per year) plant, the investment in wet scrubbers would be approximately $54,000, or 1.4% of net fixed investment. The annual treatment costs before tax, would be approximately $1.94 per ton.

The waterborne wastes from conversion of calcium carbide to acetylene are significant, and may have an additional impact on those plants at which acetylene is produced. We have not been provided with costs for the treatment of effluents which result from acetylene manufacture.

2. Price Impact

Producers of calcium carbide using air bags for air pollution abatement will have no added costs for control of waterborne wastes. Producers using water scrubbers and choosing to continue their use, thereby incurring water treatment costs of $1.94 per ton, or 2.2% of the estimated $90 per ton average selling price, would have difficulty in passing the added cost on to consumers. Price increase constraints for calcium carbide are strong, and in view of available substitutes, current overcapacity, and a declining market, any price increase would only serve to further reduce demand.

3. Plant Shutdown Impact

While continued plant shutdowns may be expected as a result of economic forces over the next several years, the effect of water pollution abatement costs related to the manfuacture of calcium carbide are expected to be relatively small. As is the case with many of the other chemicals in this study, air pollution abatement costs are considerably larger than those for control of waterborne wastes. Thus, the marginal plants have already been culled as a result of air pollution abatement impact, and those remaining plants which have not installed dry collection systems, either have sufficient commitment to bear the marginally small additional cost of scrubber effluent treatment, or to make the initial investment in a reportedly profitable air bag system. In the worst case, that of a contract supplier operating at the break-even point, it is estimated that annual cash flow from depreication would cover annual water treatment operating expenses.

Calcium carbide plants which immediately convert their product to acetylene gas have the additional problems of handling the calcium hydroxide produced as a by-product. Water pollution abatement costs relating to acetylene production have not been supplied to us by EPA and it is beyond the scope of this report to assess the impact of these treatment costs. In general, however, acetylene producing calcium carbide plants tend to be captive or contract suppliers of calcium carbide acetylene.

Finally, as described in an earlier section of this report, the calcium carbide industry faces a continued declining market due to causes unrelated to environmental pollution abatement. In the normal product life cycle, calcium carbide seems to be well beyond maturity as more economical substitute products continue to gain a larger and larger market share.

B. SODIUM SULFATE

1. Treatment Costs

Treatment costs discussed in the effluent guideline Development Document pertain only to sodium sulfate produced as a by-product of sodium bichromate manufacture. These producers collect, dry, and sell the by-product, and reportedly have no waterborne wastes or treatment costs attributable to sodium sulfate.

Production of sodium sulfate as a by-product of sodium bichromate represents approximately 10% of total U.S. production. The most important source is recovery from natural brines, followed by production as a rayon and cellophane by-product.

2. Price Impact

With no water pollution abatement costs assigned to sodium sulfate as a sodium bichromate by-product (chrome cake) no effect on

prices is expected for this product. It is unlikely, however, that a sodium sulfate price increase could be sustained in view of the high level of substitute products, foreign competition, excess capacity and a static or declining market.

3. Plant Shutdown Impact

Zero water treatment costs for producers of chrome salt cake mean no plant shutdowns. The bulk of U.S. sodium sulfate production is by producers for which no treatment costs have been developed, and therefore the impact of federal water pollution control costs on most producers of this chemical is beyond the scope of this report.

C. TITANIUM DIOXIDE

1. Treatment Costs

a. Sulfate Process

Two separate treatment approaches for sulfate process plants, acid neutralization and acid recovery, were discussed in the effluent guideline Development Document along with their respective costs. To utilize B.A.T. for a 42,000 ton plant, total treatment costs for neutralization are estimated to be $98.09 per ton, or 17.2% of current selling price, and for acid recovery $50.48 per ton, representing 8.9% of selling price. The investment in treatment facilities via either method is large--$11.5 million for neutralization and $5.5 million for acid recovery. These amounts represent respectively 55% and 26% of existing net plant and indicate the sizeable investment relative to existing plant required.

In the case of neutralization zero discharge treatment consists of solids settling, full neutralization of the waste acid streams, and the demineralization and recycle of process water. Annual costs amount to $4.12 million of which $2.35 million are operating and maintenance costs exclusive of power, and $1.15 is depreciation. The acid recovery process involves recovery and recycle of strong acid waste plus neutralization and pond settling of the remaining effluent. Annual costs for acid recovery are significantly less than those of neutralization and amount to $2.12 million. At $445,000, or 21% of the total, energy costs are high relative to the neutralization option. Operating and depreciation costs amount to another $850,000 and $550,000, respectively.

A major item of concern raised in industry interviews was the technical feasibility of the acid recovery option. For a number of years the industry has been attempting without success to develop an acceptable acid recovery procedure. Since treatment costs could be only one-half of those for neutralization, the EPA-sponsored research in this area is being watched with interest, but with considerable skepticism. Due to the uncertainty of successful development of acid recovery technology, therefore, our sulfate process water treatment cost impact analysis will be based on the neutralization method alone.

Water treatment costs for B.P.T. are not significantly lower than for B.A.T. For the neutralization method, investment drops only to $10 million and annual costs amount to $3.51 million, or 85% of B.A.T. costs. The last incremental step to B.A.T., therefore, is not significantly more expensive than full neutralization, and will probably not affect price increase/plant shutdown decisions significantly.

b. Chloride Process

Water treatment costs for chloride process wastes are estimated to be significantly less than those for the sulfate process. B.A.T. can be attained at a cost of $66.79 per ton for a 25,900 ton plant, which is a typical size plant in the industry. Total additional investment in treatment facilities for this plant is $5 million, which represents 23.5% of existing net plant.

B.A.T. annual treatment costs total $1.73 million, of which operating and maintenance costs exclusive of power account for $890,000 and depreciation another $530,000. The treatment process required to reach this level involves chemical neutralization of waste acid streams, thickening and land dumping of sludges, and removal of dissolved chlorides and sulfates through evaporation and recycle of process water. B.P.T. treatment, which is the same as E.P.P. and does not involve soluble chloride and sulfate removal, is considerably less costly than B.A.T. At $4 million and $1 million, treatment facilities investment and annual operating costs repsectively are 75% and 58% of corresponding B.A.T. figures. B.P.T. investment requirements and operating costs, therefore, are lower for chloride producers, both in absolute terms and in comparison with B.A.T. requirements.

c. Barging and Deep-Welling

Currently both cloride and sulfate wastes are being barged to sea by several producers. Sulfate barging involves deep sea dumping of strong acid, sludge, and metallic sulfate wastes and costs $8-10 per ton of product. Chloride waste barging consists of ocean dumping of strong acid and metallic chloride and oxide wastes, and costs are $5-10 per ton of product. Considerable pressure is being brought to bear by private groups to stop ocean dumping, and the future of this alternative is very uncertain. Use of barging is limited for the most part to those plants located on the coasts, and it represents a significant cost advantage over chemical treatment options.

Deep-welling is currently being used by at least one producer to dispose of chloride process wastes. Geological conditions limit deep-welling to certain parts of the country; thus, this method is not possible for all producers. Costs range from $2 to $5 per ton of product, again significantly lower than chemical treatment costs. As in barging the future of deep-welling is clouded due to unresolved questions as to the effects of deep-well wastes on surrounding water

table structures. Clearly, however, if barging or deep-welling is allowed to continue by EPA, the producers fortunate enough to be able to utilize either method will incur significantly lower water treatment costs than those companies having to employ chemical neutralization methods.

2. Price Impact

It is most probable that some part of water treatment costs would be passed on as price increases. There are several major reasons for this likelihood. In the face of a strong demand which is projected to continue for several more years, capacity will remain strained through at least 1975 when additional production facilities should come on stream. The industry is presently at 100% of practical capacity and is allocating product to customers. Secondly, there are no known substitute products which match titanium dioxide for cost effective hiding power. Foreign competition for the foreseeable future will be minimized through recent currency devaluations, the tight supply situation present in Europe, and the fact that European producers are themselves beginning to feel pollution control pressures. Lastly the water treatment costs estimated for the titanium dioxide industry are among the largest encountered for any chemical in this study. Pre-tax B.A.T. costs account for fully 16.8% of sales price for sulfate pigments, and 11.3% of sales price for chloride pigments. Applying these costs against our estimates of industry profitability, it becomes apparent that price increases would be necessary to avoid negative profitability as a direct result of water treatment costs.

At the present time the differential between sulfate and chloride process treatment costs poses a complication in assessing the magnitude of price increases for titanium dioxide pigment. The chloride producer, faced with treatment costs for B.A.T. of $0.033 per pound can obtain relief with a smaller price increase than the sulfate producer, who must cope with treatment costs of nearly $0.05 per pound. Industry sources believe that, for the next two to three years, the supply/demand situation for titanium dioxide pigment would permit sulfate producers to raise prices more than chloride producers in order to recover their higher water treatment costs. Such a differential could not exceed $0.01 to $0.02 per pound, especially in view of the chloride pigment's superior performance in many applications, and it could not be sustained if additional capacity were brought on stream or if imports become more price-competitive. It is most probable that chloride producers would raise prices only enough to cover their own treatment costs, since raising prices by the same higher amount as sulfate producers may require would increase chloride process profitability to the point where new competition would likely be encouraged. B.P.T. treatment would lower the absolute treatment costs for both chloride and sulfate producers, but would also widen the differential in treatment costs for the two processes by almost $0.007 per pound. The sulfate producer would thus be placed at an even greater disadvantage relative to the chloride producer.

3. Plant Shutdown Impact

The probability of plant shutdown is difficult to assess because of the uncertainty in the amount and duration of price increases, and the resultant profitability effects, based on water treatment costs. Sulfate producers are most likely to face plant shutdown decisions because of the age of most sulfate plants and the extremely high treatment facilities' investment projected. Confronted with an investment amounting to 50% of existing net plant, and the prospect of long-term negative profitability if prices cannot be raised to fully cover treatment costs, industry sources report that a shutdown decision would probably be made. This decision would be complicated by the prospect of continued positive cash flow from full capacity operation in the presently strong market. However, the recent closing of a chloride facility by NL Industries, even in the face of the presently strong market, indicates that producers might shut down an operation burdened with continued negative profitability.

We conclude, therefore, that over the long range one or two smaller sulfate facilities might shut down as a result of water treatment costs. The actual closings could be delayed as the producers attempt to compete in the favorable pigment market as long as possible, but we feel that the magnitude of investment and annual costs would eventually make shutdown a necessity. The chloride producers will probably be less affected by water treatment costs and we do not anticipate any chloride facility closings as the direct result of these costs.

4. Impact Analysis Sensitivity

We have assessed the sensitivity of our impact conclusions for titanium dioxide if treatment costs are higher than those estimated in the effluent guideline Development Document. We conclude that if costs are in fact understated by a factor of four, the impact on the titanium dioxide industry will be severe and substantial plant shutdown could be expected especially among sulfate producers.

With a fourfold increase in treatment costs over those shown in the effluent guideline Development Document, pre-tax costs for B.A.T. would be $0.12 per pound or 45.2% of present selling price for chloride pigment and $0.19 per pound or 67.2% of present selling price for sulfate pigment. Impact on after-tax net income and cash flow is even more severe. B.A.T. treatment costs for chloride pigment are 948% and 136% of net income and cash flow respectively, and 932% and 261% respectively for sulfate pigment. B.A.T. costs would thus exceed both net income and cash flow, and plant shutdowns would be inevitable.

Implementing treatment procedures to use B.P.T. only would reduce the absolute magnitude of treatment costs, but would widen the differential between chloride and sulfate costs and subsequent impact

effects. B.P.T. costs pre-tax would be $0.07 per pound, or 25.6% of selling price for chloride pigment, and $0.16 per pound, or 57.2% of selling price for sulfate. Both chloride and sulfate pigment would show negative profitability, but chloride cash flow would remain positive (after-tax treatment costs of 78.6% of cash flow). Sulfate pigment, with after-tax costs representing 223% of cash flow, would continue to show negative cash flow. We conclude, therefore, that substantially higher treatment costs, even with B.P.T. treatment, would result directly in plant shutdowns, and that the sulfate producers would be more severely affected.

As pointed out earlier, it should be possible for producers to obtain relief by passing some of the treatment costs along as price increases. If costs are adjusted upward by a factor of four, however, it is doubtful that this new level of treatment costs could be passed on in full. While titanium dioxide has no equally cost effective substitutes at its present price level, a price higher than about $0.40 per pound makes substitution by high brightness clays and other pigments economically attractive. Due to the surface properties it imparts, especially in paints, titanium dioxide will not be completely replaced, but its demand would be curtailed via substitution. A secondary limitation on the magnitude of potential price increases is price competitiveness of the final product in which titanium dioxide is used. Paint prices, for instance, cannot be raised substantially without losing business to other wall covering materials such as wallpaper or wood paneling. A titanium dioxide price of $0.40 per pound would result in a $0.15 per gallon increase in paint price, assuming 1.3 lbs. of titanium dioxide per gallon of paint and no substitution by cheaper pigments.

Passing on B.A.T. treatment costs in full would result in a price increase to the $0.40 per pound range for chloride pigment and to nearly $0.48 per pound for sulfate. We believe, therefore, that B.A.T. treatment costs would not be passed along completely. Passing on B.P.T. treatment costs in full will result in a more tolerable $0.35 per pound price for chloride pigment, but will still leave sulfate pigment, at nearly $0.45 per pound, susceptible to replacement by lower cost pigments. Sulfate producers would most likely be able to recover only $0.07-$0.08 per pound of their treatment costs via a price increase to $0.36-$0.37 per pound. In this situation, the industry would be operating with chloride producers fully recovering their costs and maintaining existing profitability and with sulfate producers operating with negative profitability and negligibly positive cash flow. We would expect, therefore, that even at B.P.T. treatment, price increases would not be sufficient to avoid major impact on titanium dioxide production, especially for sulfate pigment.

D. SODIUM CHROMATE AND BICHROMATE

1. Treatment Costs

The effluent guideline Development Document has estimated treatment costs for a 164 ton-per-day sodium bichromate plant to achieve E.P.P., B.P.T. and B.A.T. at $11.66, $16.45, and $16.45 per ton, respectively. E.P.P. control involves segregation and chemical treatment for chromium-6, followed by pond settling and discharge of clear effluent to surface water. B.P.T. involves evaporation to recover dissolved sodium chloride in addition to E.P.P. control. The incremental unit costs above B.L.P. (settling ponds estimated to cost $0.26 per ton), therefore, are $11.40 per ton for E.P.P. and $16.19 per ton for B.P.T. and B.A.T.

As a percentage of the estimated 1972 industry selling price of $245 per ton, E.P.P. costs amount to 4.6% while B.P.T. costs on an incremental basis amount to 6.6%. As compared to the estimated 1972 after-tax profit margin of $18.50 per ton, the incremental cost to achieve E.P.P. effluent standards is 30.8%, while achievement of B.P.T. standards would represent 43.7% of 1972 unit margins.

2. Price Impact

On balance, factors constraining price increases in the sodium bichromate industry outweigh those factors suggesting that price increases are possible. Specifically, the high occurrence of substitute product for sodium bichromate derivatives, the tough foreign competition (including imports of sodium bichromate per se, as well as imports of derivatives such as chromic acid and chrome colors) and declining future demand all argue against the possibility of price increases. Moreover, abatement cost differences exist among the three producers. The exemplary plant, for example, has already achieved E.P.P. and need make only a relatively nominal investment to utilize B.P.T. These negatives outbalance those industry factors--viz. the small number of producers (three) and concentrated market share distribution--which would tend to make price increases possible. We conclude, therefore, that the full cost of water treatment control will not be passed on as price increases.

3. Plant Shutdown Impact

In view of the conlusion that additional water treatment costs will be absorbed, there is a possibility that one of the three sodium bichromate plants will be shut down. Full absorption of the treatment costs to achieve B.P.T. would represent very nearly a 50% reduction in after-tax unit profit margins. Moreover, there is the possibility that current margins will be reduced from 1972 levels (even without increased water treatment costs) by virtue of higher future chromite ore prices. The incremental investment ($1.7 million)

for water treatment control is relatively high in comparison to the investment in existing plant. The three plants are isolated and could not achieve treatment economies with other company products. Finally, the industry faces in addition to water treatment investment both air pollution and above normal OSHA costs. With respect to the latter, the toxic nature of chromium will require safety measures beyond normal plant practices. Although on a superficial basis the industry is integrated both backward and forward, the raw material requirements--soda ash and sulfuric acid--are insufficient to justify continued operation on that basis alone. Similarly, the primary downstream derivative--chromic acid--is considered part (and a less important part) of the chromate operation. If the sodium bichromate plant were considered uneconomic, the chromic acid facility would be shut down as well.

V. IMPACT ANALYSIS--ADDITIONAL PRODUCTS

In this section, we have provided: (a) summary comments of expected economic impacts on each of the additional products and (b) back-up commentary for the summary comments only on those critical points as indicated by the impact analysis matrix. Specifically these points were those: (a) which mitigated against the possibility of the producers' raising prices to cover the additional cost for effluent treatment; and (b) where treatment costs and estimated profitability were such as to affect a plant shutdown decision. As indicated by the commentaries for each individual product and the impact analysis matrix, we have tended not to comment on those individual factors which were not relevant to the impact judgment.

A. SODIUM BICARBONATE

1. Summary

We foresee no significant economic impact on the producers of sodium bicarbonate due to requirements to reach either exemplary plant practice, best practicable technology levels of treatment or best available technology levels. This conclusion is based on the extremely modest capital requirement and operating costs specified by the Development Document to reach necessary control levels and the apparent pricing flexibility available to the producers. The ability of the producers to raise prices over the past several years has been assisted by significant reductions in capacity at a time of relatively rapidly increasing demand. These capacity reductions were brought about by the closing down of two Solvay process sodium carbonate plants which served as sources of raw material for the production of sodium bicarbonate by these companies.

2. Price Impact

As shown in the impact analysis matrix, the costs of effluent control are an extremely small proportion of the selling price. Increases in selling price in the past decade have been of such magnitude as to dwarf the control cost to insignificance. We foresee no reason that future price increases could not be effected to offset additional control costs and in fact, it would not even be noticed in the trend of rising prices. The list price for sodium bicarbonate in 1952 was at $2.10 per hundred weight. This prevailed until 1967 when it was raised to $2.55 per hundred weight. By 1966, it was again increased to $2.80 per hundred weight and in 1969 to $3.10 per hundred weight. By 1970, the price had increased to $3.40 per hundred weight and by 1973 to $4.40 per hundred weight.

The average price has quite probably been somewhat lower than the list price published for sodium bicarbonate. The average prices as

calculated from the current industrial reports of the U.S. Department of Commerce are, however, probably more misleading than list prices. This government data provides tonnage of finished bicarbonate shipped and the value. In 1971, this calculated to $49.00 per ton. These "average" prices, however, are probably distorted by the relationship that exists between Church and Dwight and Allied Chemical. Church and Dwight markets both crude and high purity sodium bicarbonate manufactured by Allied Chemical in Syracuse, New York. The company also operates a sodium bicarbonate plant in Green River, Wyoming, to convert trona to sodium bicarbonate. The Government data may include shipments of crude product to Church and Dwight's plants, thus distorting the average price.

As shown in the impact analysis matrix, only a low captive usage and the relatively low demand growth would indicate on a theoretical basis the difficulty in raising prices. We do not believe in practice, however, that either one of these considerations will tend to limit future price increases so as to offset the modest cost of effluent treatment.

a. Capacity and Captive Consumption

Estimated producers capacities in 1973 are as follows:

Church and Dwight, Green River, Wyoming	100,000 tons
Church and Dwight, Syracuse, New York	100,000
Diamond Shamrock, Painesville, Ohio	28,000
BASF Wyandotte, Wyandotte, Michigan	36,000
	264,000 tons

These producers sell a great majority of their production of sodium bicarbonate for application in the manufacture of industrial or consumer products. The food industry takes 35-40% of the total bicarbonate shipments, rubber and chemicals take about another 20%, the pharmaceutical requirement is around 13%, and fire extinguishers about 12%. The remainder is used in the soap and detergent industry, textile, paper and leather industry. The major marketer, Church and Dwight, does account for some captive consumption through consumer sale of sodium bicarbonate under the Arm & Hammer brand.

The significance of the relatively low captive consumption in the price restraint is small when considered in the light of the small number of producers competing for the business and the relatively high capacity utilization. Capacity utilization has been assisted by both an increase in a recent growth of demand and, more significantly, by the shutting down in 1971 of a 23,000 ton per year plant of Olin Corporation and a 35,000 ton per year unit of PPG. Reportedly, these units were closed down because the Solvay process soda ash plants, which provided raw material for the manufacture of sodium bicarbonate, were uneconomical.

b. Demand Growth

Sodium bicarbonate is a relatively mature product with only modestly increasing demand. The U.S. Department of Commerce current industrial report indicates shipments of sodium bicarbonate expressed as soda ash increasing from 100,000 tons per year in 1961 to 156,000 tons per year in 1971, or at an overall rate of 4 1/2% per year. The demand growth rate increased somewhat over the last five years to an average of 6% per year. No substantial change in the 10-year growth rate is foreseen for the remainder of the decade.

Growth in demand has been steady over the past decade with each year's requirements larger than the previous. There are no apparent or announced plans for significant expansion; therefore, the outlook for the foreseeable future is that capacity utilization will remain relatively high in spite of a modest growth in demand.

c. Basis for Competition

Sodium bicarbonate like other commodity chemicals is sold on specification. The exception to this is the consumer sales of sodium bicarbonate under the recognized brand name. As indicated above, we believe that this is a relatively small proportion of total U.S. requirements.

Actually under present conditions, competition is probably not only on the basis of price but also on the basis of assured supply. Even during periods when the capacity was more significantly in excess of demand, this did not inhibit steadily increasing prices as described above.

3. Plant Shutdown Impact

The Development Document indicates annual treatment costs for a 100,000 ton sodium bicarbonate plant at $2500 a year under current practices. To reach best practicable technology or best available technology conditions requires a total of $4250 per year for the same plant. An increase of only $1750 per year, therefore, is required to go from current conditions to the more stringent effluent controls foreseen. As shown in the impact analysis matrix, this is an extremely modest proportion of the estimated total after tax net income. As estimated, sodium bicarbonate producers at present price levels received an 8% after-tax return. Even should this estimate be significantly higher than actual practice, it is hard to imagine that the very modest additional cost requirements for effluent control would significantly affect any decision on plant shutdown.

a. Integration

We have classed the degree of integration as low chiefly because there is very little forward integration in the industry. In a practical

sense, there is a high degree of backward integration in the terms that Church and Dwight operates under long term commitments to Allied Chemical for the sale of sodium bicarbonate. The only non-integrated plant in the industry is Church and Dwight's facility in Green River, Wyoming, constituting about 40% of total capacity. This plant is operated on products supplied from Allied Chemical's trona facility at Green River. We assume that this facility is protected by a long-term contract with Allied and by the long standing relationship between Church and Dwight and Allied, whereby Allied has normally acted as the manufacturing partner and Church and Dwight the marketing partner for sodium bicarbonate.

b. Emotional Commitment

Emotional commitment of the producers is hard to assess. We assume that Diamond Shamrock and BASF Wyandotte would have little commitment to the manufacture of sodium bicarbonate. Church and Dwight, however, has not only developed a consumer marketing franchise but sodium bicarbonate and sodium carbonate constitute the bulk of sales of Church and Dwight Company Specialty Chemicals Division.

c. Ownership

As described, most of the capacity for the production of sodium bicarbonate is controlled by multi-industry concerns, Allied, Diamond Shamrock and BASF. All of these companies do have a variety of options for employment of capital. We do not foresee, however, that there are sufficient negative concerns indicating plant shutdowns so as to restrict the very modest investment required. The Development Document indicates that currently a 300 ton per day sodium bicarbonate facility has a $10,000 investment in water pollution abatement facilities and this need only be increased to $15,000 to meet all future effluent control standards.

B. SOLAR SALT

1. Summary

In the solar evaporation process, seawater or salt lake water is concentrated by evaporation over a period of five years in open ponds to yield a saturated brine solution. After saturation is reached (approximately 30° Baume) the brine is fed to a crystallizer where sodium chloride precipitates leaving behind a concentrated brine solution (bittern) consisting primarily of sodium, potassium, and magnesium salts.

According to the Development Document the bittern solution, which contains all of the wastes from the process, is presently stored (ponded) at all facilities. Consequently, the solar salt industry is faced with no incremental costs to achieve zero discharge and there will be no negative impact on solar salt producers from new water

pollution abatement procedures. The Development Document estimates existing costs for bittern storage at the exemplary facility (annual capacity at very nearly 1 million tons) at $2.34 per ton.

2. Price Impact

Although the question is academic, examination of some of the competitive factors impacting on the solar salt industry indicates that if there were incremental costs associated with water treatment, solar salt producers would be hard put to pass much if any of the costs on as price increases.

a. Substitute Products

Solar salt is marketed as harvested (so-called "undried stack run") or further processed (via size classification and/or purification) before sale. When sold as such it competes with rock salt (valued F.O.B. mine at approximately $3 per ton) primarily for chemical markets (basically chlor-alkali production). When purified and classified by particle size it competes with vacuum pan evaporated salt at unit values ranging between $6 and $40 per ton. Therefore, there is no other chemical that competes with solar salt as a direct substitute. The other sources of salt--particularly rock salt for which there are no waterborne wastes--are significant constraints on the solar salt producers to raise prices unilaterally. (The only exception might be the use of calcium chloride as a replacement for sodium chloride in highway snow and ice control, but even here the use of calcium chloride is complementary rather than substitutive.)

b. Demand Growth

Although Commerce Department data for U.S. consumption of solar salt are not available, U.S. production of solar salt has exhibited a pattern of static to very slow growth. Actual production data for the last ten years in thousands of tons are as follows:

	Thousands of Tons
1972	1799
1971	1937
1970	1538
1969	1907
1968	1900
1967	1729
1966	1769
1965	1700
1964	1592
1963	1766

c. Foreign Competition

U.S. solar salt producers have been under extreme competitive pressure from Mexican imports of solar salt. The bulk of U.S. solar salt production is in California and to a lesser extent Utah. In 1972, Mexican imports of solar salt totaled 1.25 million tons with a unit value of $2.29 per ton. The competitive threat of low-cost Mexican solar salt also effectively constrains price increases by western U.S. solar salt producers.

d. Abatement Cost Differences

Water pollution abatement costs for U.S. solar salt producers are equal to foreign competitors (in that they are zero) and better than equal (in that they are less) with respect to U.S. producers of evaporated salt.

e. Price Elasticity of Demand

Increased prices for U.S. solar salt would result in reduced demand from consumers who have the option of increasing purchases of foreign solar salt or domestic rock salt.

3. Plant Shutdown Impact

With no new water treatment costs as indicated in the Development Document, there will be no solar salt plant shutdowns directly attributable to water pollution abatement measures. As indicated in the preceding paragraphs, however, if there were water treatment costs, solar salt producers would find it difficult to raise prices in order to pass on treatment costs.

C. EVAPORATED SALT

1. Summary

The Development Document has estimated incremental water treatment costs for both B.P.T. and B.A.T. for evaporated salt producers at $0.44 per ton. In comparison with the reported 1972 unit value for evaporated salt of $26.94 per ton, the cost of water treatment represents 1.64% of sales value. This relatively nominal percentage in combination with competitive conditions in the industry wherein the only constraints against price increases are low captive usage (essentially zero) and modest demand growth (2.5% per year in the post-World War II period) leads to the conclusion that evaporated salt producers will be able to pass on the added cost of water treatment through higher prices. It follows, therefore, that plant shutdowns as a result of new water pollution abatement standards are unlikely.

2. Price Impact

The only factors acting as constraints against price increases for evaporated salt in our format are low captive usage and relatively low demand growth. For practical purposes, there is no captive usage at all by evaporated salt producers--all production is sold to merchant consumers. In the context of the evaporated salt market, however, this factor is not a strong constraint against price increases. Similarly, although demand growth has been low (approximately 2.5% per year in the post-World War II period) demand increases have been steadily upward on a year-to-year basis. Although the U.S. evaporated salt market has not been characterized by dynamic growth, it has experienced consistent growth. These two weak price increase constraining factors are outweighed by the following considerations.

a. Substitute Products

There are few, if any, substitutes for evaporated salt in its major applications. The other primary forms of salt (rock or brine) don't compete with evaporated salt for most of its end uses.

b. Capacity Utilization

Capacity data for U.S. evaporated salt manufacturing facilities are not available. It is reasonable to assume, however, that plant capacities and demand are in reasonable balance. We base this assumption on the predictable nature of year-to-year demand growth and the fact that the number of evaporated salt producers has not changed. That is, with no new market entrants to upset the supply position of existing competitors and with relatively few year-to-year upsets in the growth pattern, we assume that there has been a disciplined expansion of plant capacity in reasonable concert with market demand.

d. Foreign Competition

Although Bureau of Mines data for salt imports are not segregated by type of salt, the identity of the importing country--and particularly the major importing countries--indicates that only nominal quantities of evaporated salt comes from foreign sources. The major importer of salt to the U.S. is Mexico, supplying almost exclusively solar salt. The next largest importer is Canada, almost all of whose salt exports to the U.S. are in the form of rock salt. The third largest importing country is the Bahamas which supplies solar salt exclusively. The unit value of total imported salt in 1972 was $3.46 per ton, another indication that imports are comprised of the lower valued salt types, i.e., rock salt and solar salt.

e. Abatement Cost Differences

There is no indication in the Development Document that there would be abatement cost differences between the various evaporated salt producers.

f. Price Elasticity of Demand

As indicated by the absence of substitute products and the small percentage represented by evaporated salt of the total manufacturing cost in its applications, demand for evaporated salt is relatively insensitive to price.

g. Basis for Competition

Although price is an important factor in marketing evaporated salt, there is opportunity for product differentiation through quality control, particle size control, and the addition of additives to impart desirable physical and nutritive characteristics for specific use industries. In addition, there is an opportunity and need to provide both technical and marketing service. The opportunity for product differentiation and to provide service to the user also makes nominal price increases possible.

h. Market Share Distribution

Although individual company capacity data are not available (from which market share information could be inferred), it is probable that the three major salt producers--International, Morton, and Diamond Crystal--are also major evaporated salt suppliers. This would indicate a relatively concentrated market share distribution pattern.

3. Plant Shutdown Impact

Based on our conclusion that competitive conditions in the evaporated salt industry will allow producers to pass on the added costs of water treatment through price increases, no plant shutdowns would result from new water quality standards. The relatively high costs of water treatment in comparison with estimated profits (after tax costs equivalent to 13.7% of after tax profits for both B.P.T. and B.A.T.) and fixed investment (an investment in water treatment facilities equivalent to nearly 34% of existing plant investment for both B.P.T. and B.A.T.) suggests that producers would be motivated to recover the investment through price increases.

D. SODIUM SILICATE

1. Summary

The cost of water effluent treatment indicated by the Development Document is small enough that, in an expected environment of relatively high capacity utilization, price increases may be effected to compensate for such increased cost. No plant shutdowns can be anticipated for sodium silicate plants to which the Development Document is applicable.

2. Price Impact

As indicated in the impact analysis matrix the price increase constraints relative to sodium silicate water effluent treatment costs are limited to the following.

a. Capacity Utilization

While 1972 capacity utilization, at approximately 70% of installed capacity, is sufficiently low to contribute to a highly competitive environment, an environment in which price increases necessary to offset water effluent treatment costs might be difficult to achieve, there are indications that a major increase in capacity utilization will be effected over the next two years. After five years of static production volume, U.S. sodium silicate production increased 6% in 1972. And for the first seven months of 1973, production is 13% higher than for the same period of 1972. Thus capacity utilization in 1973 is likely to be 80% and less constraining relative to future price increases.

b. Captive Usage

Sodium silicate is used captively in the production of fluid bed cracking catalysts, rubber reinforcing pigments, detergents, and for further processing to sodium metasilicate. However, many of the captive users also are merchant buyers, frequently on an "over-the-fence" long-term contractual basis. Such contracts tend to influence the marketing environment in much the same way as captive usage. Thus the low captive usage factor is augmented by the special contractual arrangements and is not a substantial constraint in the case of sodium silicate.

c. Demand Growth

Sodium silicate production is recorded by U.S. Department of Commerce:

Year	Production (M Tons)
1967	613
1968	633
1969	657
1970	628
1971	628
1972	663
1973 (7 mo.)	416

As indicated under Capacity Utilization, demand was relatively static for the period 1967-72 and then increased sharply in 1972-73 because of household detergent consumption. The sharp rise in detergent consumption was initially motivated by local legislative restrictions

(city, county, state) on phosphate content. The household detergent manufacturers increased silicate content to compensate for phosphate reduction. In the face of an adverse marketing environment, phosphate manufacturers understandably made no plans to expand phosphate capacity. A shortage of phosphates then developed and the high energy requirements of phosphate furnaces probably precludes new furnace capacity in the short term and the long term. As a result the reduction of phosphate content in household detergents and expanded use of solicates is now directly attributable to both the legislative restrictions and the phosphate shortage. In other words, average phosphate content is lower than required to meet legislative restrictions because of phosphate unavailability.

The household detergent reformulation process, and attendant rise in silicate consumption, is not expected to carry beyond 1975, after which the growth in silicate demand should be no more than 2-3% per year. Thus, we have characterized demand growth in the impact analysis matrix as low.

d. Basis for Competition

The primary basis for competition in marketing silicates is price. This does not mean, however, that price competition results in frequent changes of supplier pattern or price erosion. The marketing strategies of major producers depend to a significant degree upon market proximity to large consumers, proximity which frequently includes "over-the fence" transfer, and supply contracts. This tends to provide price stability and an opportunity to negotiate price increases necessary to compensate for increased manufacturing costs.

The above mentioned constraints are unlikely to be significant because the water effluent treatment costs provided by the EPA Development Document are no more than 1% of selling price.

3. Plant Shutdown Impact

In developing the environment for the plant shutdown decision in the impact analysis matrix, the conditions which might lead to a sodium silicate plant shutdown because of the cost of water effluent treatment are described below.

a. Ratio of After Tax Treatment Cost to After Tax Net Income

Lacking current experience detail for after tax net income attributable to sodium silicate production and marketing, we assumed that 5% of selling price was reasonable for this class of inorganic chemical. More thorough economic analysis was not possible under the scope of our assignment. Based on the 1971 Department of Commerce unit sales value, the 5% after tax net income is $4.30 per ton.

The EPA Development Document indicates the cost differential of achieving acceptable effluent treatment via exemplary plant practice as $.40 more than base level practice. The differential over base level practice necessary to achieve best practicable technology or best available technology levels is $.90. Thus the ratios of after tax treatment costs to after tax net income are 10% for E.P.P. and 20% for B.P.T. and B.A.T. Such an impact on profitability, if not recoverable through price increase, could contribute to a decision for plant shutdown.

b. Chemical Complex

Isolated plants are more likely to be shut down because of an inability to take advantage of common effluent treatment facilities. In general the locations of the sodium silicate plants are more influenced by the need for proximity to specific customers than by the advantages of including them in large chemical complexes.

c. Ownership

Because most of the sodium silicate production is owned by large multi-product chemical companies, plant shutdown decisions can be made on the basis of maximum return on investment with a multiplicity of choices. The shutdown of a single plant becomes less critical to the total operations of the corporation and is more readily made than would be the case if a dramatic reduction in total sales were attributed thereto.

E. SODIUM METAL

1. Summary

We expect little economic impact from the imposition of effluent controls to achieve E.P.P., B.P.T., or B.A.T. levels in the production of sodium metal. Sodium metal, produced by the electrolysis of molten sodium chloride, has by far its major application in the production of alkyl leads (tetraethyl and tetramethyl lead) for use in gasoline. The alkyl lead producers have integrated back to sodium metal and account for the great bulk of its production. The costs of effluent control specified by the Development Document, although a significant proportion of the probable profitability of producing sodium metal, are, we believe, a very much smaller proportion of the profitability associated with the entire operation of producing alkyl leads, including the manufacture of metallic sodium. If demand were to be sustained for alkyl leads, the relatively minor cost of effluent control for sodium manufacturing portion of the total process could either be absorbed by the manufacturers or, more likely, passed through to the purchasers of alkyl leads.

The total demand for alkyl leads will very probably decline significantly within the next three to four years. This will occur

chiefly because of the imposition of automobile emission control standards. This will reduce the demand for sodium metal and could quite possibly result in the shutdown of some sodium metal producing plants. It would not be reasonable, however, to attribute the plant shutdown to required investment and/or additional cost caused by meeting effluent control standards for metallic sodium. The plants would very likely close in any event with the substantial reduction in demand foreseen.

2. Price Impact

Price increase constraints are not particularly meaningful applied to sodium metal because of the integrated nature of production. Producers of sodium metal account for over three-quarters of its total use in the United States. Most of the "price" therefore is a transfer price within a corporate enterprise. This transfer price could and most likely would be adjusted to take into account the higher manufacturing cost caused by imposition of effluent control standards on the manufacture of sodium metal.

a. Substitute Products

Sodium metal is primarily used in the production of tetralkyl leads (tetraethyl and tetramethyl) which are used as gasoline additives for the prevention of knocking. This end use represented 83% of sales. Tetralkyl lead production depends on sodium. These products have been put in gasoline for decades, and there is no substitute which is as satisfactory for improving octane rating per unit of cost. Nevertheless, certain aromatics may be used in the future because of emissions control standards affecting the use of leads.

Other uses for sodium include reduction of metals, especially titanium (6%), and manufacturing sodium peroxide (2%). Sodium metal receives severe competition from magnesium for use in metal reduction. Demand for sodium peroxide in pulp bleaching has decreased dramatically in recent years, losing markets to other chemical products such as hydrogen peroxide. Thus, for its major use sodium has little substitute product competition, but there is significant substitute product competition for minor uses of sodium.

b. Capacity Utilization

During 1969-1972 nationwide sodium metal manufacturing capacity was 189,000 short tons:

	Tons/Yr.
DuPont, Memphis, Tennessee	35,000
DuPont, Niagara Falls, New York	42,000
Ethyl, Baton Rouge, Louisiana	45,000
Ethyl, Houston, Texas	30,000
Reactive Metals, Inc., Ashtabula, Ohio	37,000
	189,000

For those four years, production and capacity utilization were as follows (in short tons):

	Production	Capacity Utilization
1969	164,700	87%
1970	171,200	91%
1971	153,100	81%
1972	159,900	85%

c. Captive Usage

Sodium is an overwhelmingly "captive" product for tetralkyl lead and other uses. Production is in the hands of three companies—DuPont, Ethyl, and Reactive Metals. DuPont and Ethyl have 83% of the nation's tetralkyl lead manufacturing capacity. Reactive Metals has been the predominant user of sodium for titanium reduction. The highly captive market indicates that decisions regarding sodium metal production will be made in direct consequence of the manufacturers' experience with the sale of end products, primarily tetralkyl leads.

d. Demand Growth

Automobile emission controls will severely decrease the total amount of lead used in gasoline. Likewise, a general decline in aerospace, commercial, and military aircraft and missile spending is causing a dramatic drop in the demand for titanium. Demand for sodium metal may decrease by almost one-third by 1976 or 1977.

e. Price Elasticity of Demand

Because the cost of pollution abatement for producing sodium metal is only a very small fraction of the market price for tetralkyl lead, increased abatement costs will not cause the integrated tetralkyl lead manufacturers to cut back sodium production or close plants. However, decreased market demand for the lead may result in cutbacks and may make it difficult to pass sodium abatement costs on to the purchasers of the lead.

f. Basis for Competition

Most sodium production is captive. Other sales, however, are made primarily on the basis of price. The list price during 1970-1972 has been 18-3/4¢/lb., tanks, works.

g. Market Share Distribution

Sodium production and tetralkyl lead production are concentrated among only a few large companies, all of which have sizable production and comparably sized plants. This condition is favorable for passing on cost increases to consumers.

3. Plant Shutdown Impact

The after-tax pollution abatement costs to reach B.P.T. and B.A.T. levels are provided by the Development Document at approximately $5.00 per ton of sodium produced. We estimate sodium manufacturing costs at $200 per ton including a $60 per ton credit for chlorine produced as a by-product from the electrolysis of sodium chloride. The list price for sodium metal is $375 per ton but we estimate the average price of product sold or transferred is $220 per ton. Effluent control costs to achieve B.P.T. and B.A.T. levels would therefore account for approximately 25% of total profitability. The achievement of E.P.P. levels would require costs of approximately 10% of estimated profitability.

The abatement costs are less significant when one compares them to the list price of tetraethyl lead, the largest selling type of tetralkyl lead. The tetraethyl lead list price is $750 per ton. Only .325 pounds of sodium metal is used to make one pound of tetraethyl lead. The sodium after-tax abatement cost of about $1.00 per ton of tetraethyl lead is quite small compared to the lead's price and probable profitability.

a. Cash Flow

The magnitude of the abatement costs are too small to seriously affect cash flow even if adverse tetralkyl lead market conditions make it difficult to pass the abatement costs on to the consumer.

b. Ratio of Investment in Treatment Facilities to Net Fixed Investment

A 25,000 tons capacity sodium plant requires a fixed investment of approximately $15 million or about $600 per ton of capacity. For that sized plant the investment for pollution abatement at B.P.T. and B.A.T. levels is about $700,000. This ratio of abatement investment (5%) is, therefore, probably not initially restrictive.

c. Integration

Since the manufacturing of sodium metal is overwhelmingly controlled captively by the manufacturers of tetralkyl leads, they would be reluctant to close sodium plants unless they were cutting back on alkyl lead production for other reasons.

d. Emotional Commitment

DuPont, because of its diversity, is probably not deeply committed to sodium metal or tetralkyl lead production. However, for Ethyl Corp. tetralkyl leads are an important part of their business in the United States and abroad, so they would probably have significantly greater interest in continued production.

F. SODIUM SULFITE

1. Summary

The EPA Development Document provides water effluent treatment costs which are unlikely to have any significant economic impact on the small volume of merchant sodium sulfite produced by the process considered in that Development Document. For the uses to which we believe such special grades of sodium sulfate are marketed, the additional cost of water effluent treatment can be either absorbed or compensated for by appropriate price increases.

Our analysis of economic impact is predicated on the structure of water effluent treatment costs described in the Development Document. Due to different approaches to reach different levels and the consequent recovery of different by-product chemicals, costs per ton of product produced decrease dramatically between exemplary plant levels and best available treatment levels. Effluent control costs to reach exemplary plant practice levels are specified at approximately $3.00 a ton in producing sodium sulfite through the reaction of sulfur dioxide with soda ash. To achieve B.P.T. levels requires approximately 10¢ per ton less, and to reach B.A.T. levels provides a net income of approximately $1.55 per ton due to the recovery of sodium sulfite. The Development Document does not specify why, given this possibility, the industry does not currently utilize the recovery system proposed.

The economic impact analysis is difficult due to the fact that the great bulk of merchant sodium sulfite produced and sold is by-product from the production of phenol and resorcinol. A relatively small proportion, probably less than 20%, is high purity material manufactured from soda ash for photographic use and sold at what we believe to be a substantially higher price.

2. Price Impact

As indicated in the impact analysis matrix, the price increase constraints relative to sodium sulfite water treatment costs are the following.

a. Ratio of Before Tax Treatment Cost to Selling Price

The impact analysis matrix shows values ranging from 6% for E.P.P. and B.P.T. to minus 3% for B.A.T. effluent control practices. These treatment costs consider only the process for the manufacture of sodium sulfite from sulfur dioxide and soda ash. The values given are based on the average prices for sodium sulfite obtained from the Census Bureau data for 1971. We believe the relatively small proportion of the sodium sulfite produced by this process, however, sells at significantly higher prices than the average price. Photographic grade sodium sulfite sells at a price of around $200 per ton. On the assumption that sodium sulfite manufactured by the process described goes

principally for photographic applications, the ratio of before tax treatment cost to selling price for this particular product is approximately one-quarter of the ratios shown in the impact analysis matrix.

b. Substitute Products

Three fourths or more of the sodium sulfite produced in the United States is used for the production of neutral sulfite semichemical pulp. The pollution, air pollution and particularly water pollution, aspects of the NSSC process can be significantly relieved by the use of new processes which produce a pulp of similar properties without the use of sodium sulfite whether purchased or produced in situ. Thus the largest market for sodium sulfite, one which consumes a majority of the sodium sulfite produced, can utilize substitute products for sodium sulfite if there were significant price increases based on water effluent treatment. Even more important, however, is the probability that such substitution will be effected regardless of whether there are price increases for sodium sulfite. The paper pulp industry will find it more and more difficult to produce and use captive sodium sulfite because of the restricted availability of soda ash as a raw material and the water effluent problems attendant to the manufacture and use of sodium sulfite in the pulping process.

c. Demand Growth

Demand for sodium sulfite has increased in this past decade at a rate of around 4% per year. If, as is indicated, there is major substitution of sodium sulfite used in the production of NSSC type pulp by new non-sulfur utilizing processes, there will be reduced total consumption of sodium sulfite. Even those pulp mills remaining on the use of neutral sulfite semichemical pulping will tend to have a higher future recovery of sulfur and sodium values from pulp liquor due to more stringent effluent controls on the pulp and paper industry. This will mean, therefore, less sodium and sulfur values required for make-up per ton of pulp produced.

d. Abatement Cost Differences

There are quite probably differences in pollution abatement costs between various producing plants. The largest differences very probably would be between those plants producing by-product sodium sulfite from phenol or resorcinol processes and the producers of sodium sulfite by reaction of soda ash and sulfur dioxide. The latter category, the process covered by the Development Document, includes plants with capacities which vary by more than threefold. We would expect there would be significant differences in effluent control costs between the smallest and largest of these plants. The plant specified in the Development Document is for approximately 16,000 tons per year capacity, a relatively large sodium sulfite plant utilizing soda ash and sulfur dioxide.

e. Basis for Competition

For the major market for sodium sulfite, the production of NSSC pulp, price has been the primary consideration in determining source of supply, including the decision to make or buy. In the future, however, the make or buy decision will be complicated by the impact of (1) periods of poor availability of soda ash resulting from shutdowns of Solvay process operations; 92) water pollution problems at NSSC plants leading to installation of direct sodium sulfite recovery; and (3) availability of non-sulfur processes for manufacture of pulp similar in properties to NSSC pulp. The basis of competition for high purity sodium sulfite has been marketing capability as well as price.

3. Plant Shutdown Impact

The following factors relate to the sodium sulfite plant shutdown decision.

a. Ratio of After-Tax Treatment Cost to After Tax Net Income

As previously described, the only treatment cost available from the Development Document is based on soda ash and sulfur dioxide process. We have not developed detailed economics of manufacture by this process as this was not included in the scope of our assignment. We estimate that treatment costs for all three levels of treatment described in the impact matrix would be low relative to profitability. This is based on the assumption that the major part of the product produced is being sold at $200 a ton to the photographic chemical market.

Regardless of profitability, the effluent treatment described by the Development Document to achieve B.A.T. levels would be low relative to profitability as the Development Document specifies that by-product recovery results in the development of a negative cost of about $1.55 per ton of product produced.

The consideration of this ratio is not valid for the great majority of merchant sodium sulfite produced as by-product of phenol and resorcinol production. No costs are available from the Development Document relative to effluent control and a description of profitability of sodium sulfite production via these by-product routes is necessarily arbitrary as the product must be produced, although not necessarily recovered, as a consequence of the production of the major product of concern.

b. Other Environmental Problems

Because sulfur compounds tend to create both air and water pollution problems, and because the production of sodium sulfite is generally associated with phenol production (by-product thereof), resorcinol production (by-product thereof) or pulp production (captive raw material utilization), it is difficult to conceive of such operations having an isolated problem of water pollution tied to the sodium sulfite production alone.

c. Emotional Commitment

Neither the by-product operations nor the NSSC pulp captive production represents emotional commitment. These are essentially viewed as economic necessities.

d. Ownership

Except for the captive NSSC production, sodium sulfite capacity is owned by large multi-product chemical companies with other opportunities for investment besides that represented by sodium sulfite manufacture.

G. CALCIUM CHLORIDE

1. Summary

Because the water effluent treatment costs provided by the Development Document are less than 1% of sales price, we do not foresee significant economic impact for plants where such costs are applicable. High capacity utilitation and concentration of production within two major chemical companies are factors which provide an environment in which the costs incurred may be compensated for by price increases.

2. Price Impact

As indicated in the impact analysis matrix, the price increase constraints relative to calcium chloride water effluent treatment costs are the following:

a. Captive Usage

Captive usage is low in the sense that most of the calcium chloride produced is sold as calcium chloride by the producer and the opportunities for forward integration into products for which calcium chloride is a raw material are limited. Over half of the calcium chloride produced is marketed for highway deicing or rural road dust control, markets served by the calcium chloride producers.

b. Demand Growth

The demand growth over the past five years has been limited to 3-4% per year and this is unlikely to change dramatically in the future. The highway deicing market loss due to local legislation restricting the consumption of salt mixtures (rock salt and calcium chloride) are compensated for by growth in other markets.

Furthermore, the relatively low demand growth is compensated for by the high capacity utilization factor of 90%. High capacity

utilization has resulted from plant shutdowns attributed to unfavorable economics and concern about the future markets. The market concerns are ecologically directed and primarily focused on use of calcium chloride and rock salt for highway ice control. The ice-control market has declined from about one-third of the U.S. calcium chloride market to about one-quarter thereof. The plants that were shut down derived by-product calcium chloride from soda ash production by the Solvay process. Reduction of total capacity from these shutdowns in the past few years amounted to about 25% with half of this reduction now regained through expansion of by-product calcium chloride recovery from brine chemical operations for which magnesium hydroxide is the product of primary interest. Capacity utilization is appropriate for the demand growth and therefore low demand growth is not per se a price increase constraint for calcium chloride.

c. Basis for Competition

Historically the price competition for the highway and rural road markets for calcium chloride has been stringent, with freight equalization limiting the marketers' geographic scope. Thus a significant price increase for the product from a specific plant would provide an umbrella for a competitive plant to broaden its geographic scope. The fact that price has been the primary basis for competition is a valid price increase constraint. This is now compensated for by the heavy concentration of market share distribution by two major suppliers holding 80% or more of the market.

d. Number of Producers

While there are about ten U.S. producers of calcium chloride, only two are large volume producers. Five of the smaller volume plants are located in the far western states of California, Washington, and Utah and limited by freight equalization to the western U.S. market. Thus the number of producers is not an effective price increase constraint.

The above constraints are unlikely to be significant because they are largely compensated for by high capacity utilization and concentration of production. Furthermore the water effluent treatment costs provided by the Development Document are only 0.5% of the sales price. However, it is important to emphasize that the effluent treatment costs are not applicable to the production of calcium chloride as a by-product from the manufacture of soda ash by the Solvay process. Furthermore, such calcium chloride treatment costs are associated with soda ash effluent treatment costs. This distinction is important in examining the following factors relevant to a plant shutdown decision.

3. Plant Shutdown Impact

a. Ratio of Treatment Cost to Net Income

As calcium chloride is a by-product of other operations, the definition of net income due to its sale is necessarily arbitrary. In

view of the very low treatment cost provided by the Development Document--18 cents before taxes per ton of product--we have assumed this to be a low proportion of the net income assigned to the sale of calcium chloride.

b. Ownership

At least 90% of the calcium chloride capacity is owned by large multi-industry companies, so the plant shutdown decision is unhampered since it is not the major business of the producer. This is evidenced by shutdowns of two calcium chloride operations in the United States in recent years. Thus, if there are price increase constraints, further plant shutdowns might be expected. It is our evaluation, however, that price increase constraints will not prevent necessary increases to cover those water effluent treatment costs presented in the Development Document. Nevertheless, these same water effluent costs do not apply to production of calcium chloride as a by-product of soda ash which is a significant portion of the existing calcium chloride capacity. That capacity which is dependent upon continuance of soda ash production relates primarily to soda ash water effluent treatment costs also presented in this document.

H. SYNTHETIC SODA ASH

1. Summary

As estimated by the Development Document, incremental water treatment costs for synthetic soda ash producers to achieve B.P.T. and B.A.T. levels are 0 and $0.66 per ton, respectively. The B.A.T. cost constitutes 1.9% of the $34.60 per ton selling price in 1972. Even this nominal cost, however, could not be passed on as a price increase by the synthetic soda ash producers if producers of natural soda ash, the primary competitive product to synthetic soda ash, did not correspondingly raise prices. On the other hand, in spite of narrow profit margins for synthetic soda ash producers, the modest magnitude of the after-tax treatment cost which would have to be absorbed and the small amount of plant investment for treatment facilities in comparison to existing fixed investment in production facilities are insufficient to cause plant shutdowns.

2. Price Impact

Competitive conditions in the synthetic soda ash industry are such that severe constraints exist which would make specific price increases to cover large, new costs for water treatment extremely difficult. The primary price increase constraints are the existence of substitute products, declining production of synthetic soda ash, unequal abatement cost differences (with respect to natural soda ash), high price elasticity of demand, and an undifferentiated product wherein price is the only basis for competition.

These constraints against price increase outweigh those factors in the industry which, in the absence of constraints, might make it possible to increase prices. These include a relatively high operating rate at the present time (approximately 95% of capacity in 1972), captive usage representing very nearly 25% of production, the almost complete absence of foreign competition, concentrated market share distribution, and the relatively few (five) producers.

No price increases would be necessary for B.P.T. since the guidelines recommendation is for no change in treatment from current industry practice. That is, the incremental costs for B.P.T. will be zero. (In fact, the Development Document indicated that the E.P.P. resulted in a profit of $1.17 per ton of soda ash produced. The profit resulted from converting 20% of the effluent to saleable calcium chloride.) The revised cost for B.A.T. was estimated at $0.66 per ton, equivalent to 1.90% of the 1972 selling price of $34.60 per ton. Even this nominal charge could not be passed on as price increases by the Solvay soda ash producers if at the time the standard comes into effect there are ample supplies of natural soda ash and caustic soda.

a. Substitute Products

Synthetic soda ash competes directly with natural soda ash as well as caustic soda and, to a lesser extent, with other alkaline materials such as lime and salt cake. The major competition to synthetic soda ash comes from natural soda ash. Natural soda ash is produced primarily in Green River, Wyoming, and to a lesser degree, from naturally occurring salt lake brines in California. Preliminary Commerce Department data indicate that in 1973, production of natural soda ash (estimated at approximately 4 million tons) will surpass production of synthetic soda ash (estimated at 3.6 million tons) for the first time. As recently as 1960, synthetic soda ash represented 85% of total U.S. production of soda ash. There is no significant quality or performance difference between natural and synthetic ash. The loss of market to natural soda ash has been due to significantly lower costs of manufacture for the natural product.

In addition to natural soda ash, synthetic soda ash also competes with caustic soda (which can be substituted in most of the soda ash applications). The substitution of caustic soda for soda ash has occurred at varying rates for the past 15 years or so. For example, soda ash has lost all of the alumina, a major part of the paper, and some phosphate and silicate markets to caustic soda. The selection of soda ash or caustic soda is almost entirely a matter of economics, viz. the delivered price of the two materials on an Na_2O equivalent basis. At the present time both soda ash and caustic soda are in tight supply so that the erosion of soda ash markets by caustic soda has been temporarily arrested.

To a lesser extent soda ash competes with lime and salt cake (sodium sulfate), both lower cost materials than soda ash but with less desirable properties for most of the soda ash applications.

b. Demand Growth

Although overall demand for U.S. soda ash (domestic market plus exports) has grown at an average annual compound rate of about 3% in the last ten years, the output of synthetic soda ash has actually declined. For example, in the mid-1960's synthetic soda ash production was approximately 5 million tons versus 4.3 million tons in 1972. As mentioned, 1973 production will apparently total 3.6 million tons. All of the growth in the total soda ash market has been supplied by natural soda ash (which has also made up the shortfall in soda ash supply resulting from the decline in synthetic soda ash production).

c. Abatement Cost Differences

There is no information in the Development Document which would infer that there are abatement cost differences among the synthetic soda ash producers themselves. However, because the producers of natural soda ash are not faced with comparable water treatment costs, and because synthetic soda ash is directly competitive with natural soda ash, a condition of unequal abatement costs exists which would make it difficult for the synthetic soda ash producer to increase prices if producers of natural soda ash (or caustic soda) did not want to raise prices.

d. Price Elasticity of Demand

Because synthetic soda ash and natural soda ash are completely substitutable one for the other, the price of either one could not be raised to a premium versus the other without a shift in market demand to the lower cost form. A similar situation exists with respect to caustic soda, i.e., if synthetic soda ash prices were increased such that caustic soda became less costly on an ash equivalent delivered basis, there would be a shift of market demand away from synthetic soda ash as sodium alkali consumers used increasing amounts of caustic soda. Because the demand for synthetic soda ash (in competition with natural soda ash or caustic soda) is very sensitive to its price, it would be difficult for the synthetic soda ash producers to raise prices to cover increased costs of water treatment.

e. Basis for Competition

Price is the basis for competition among soda ash producers, representing another strong constraint against higher prices for one of the competing forms of sodium alkali.

3. Plant Shutdown Impact

The synthetic soda ash industry has been characterized in recent years by long periods of marginal profitability interspersed with shorter periods of improved profitability (as in late 1973) when competitive conditions in the industry allowed producers to raise prices in concert with higher natural soda ash and caustic soda prices. The long-term outlook is for minimal and diminishing profit margins for synthetic soda

ash producers. In spite of these conditions, the B.A.T. costs of $0.33 per ton (after taxes) are not sufficient by themselves to cause plant shutdowns. (As indicated B.P.T. costs will be zero for the industry.)

a. Ratio Treatment Costs to Net Income

Average after-tax profits for synthetic soda ash producers in 1972 are estimated at $0.75 per ton. In comparison, the B.A.T. after-tax cost of $0.33 per ton would represent very nearly 44% of profits.

b. Cash Flow

In 1972 cash flow for the typical synthetic soda ash plant was $1.75 per ton, made up of the aforementioned $0.75 per ton of after-tax profits plus $1.00 per ton of depreciation. Even after the B.A.T. costs of $0.33 per ton, therefore, cash flow would remain positive.

c. Treatment Facilities Investment

The typical soda ash plant in 1972 had a fixed investment of $8.75 million. The incremental investment for B.A.T. of $1.20 million therefore represents 13.7% of existing plant investment. The investment required for B.A.T. is not a significant sum for the major chemical companies comprising the list of synthetic soda ash producers, either in absolute terms or in comparison with existing fixed plant investment.

d. Integration

The soda ash industry uses some of its output (approximately 25%) captively for production of sodium phosphates, sodium silicates, sodium bicarbonate, sodium chromate, glass (to a very minor extent) and alkaline cleaners. Some of the producers of synthetic soda ash are integrated backward to a minor extent, primarily to lime or limestone. In any event, the degree of vertical integration for any single producer is not sufficient justification for continued plant operation if the economics are unsatisfactory.

I. POTASSIUM SULFATE

1. Summary

The largest quantity of potassium sulfate produced in the U.S. derives from the separation of natural brines. The second most significant process is the manufacture of potassium sulfate from langbeinite through the reaction of this ore with potassium chloride to produce potassium sulfate with magnesium chloride as by-product. Langbeinite processing accounts for approximately 40% of potassium sulfate capacity in the United States. Small amounts are derived from the Hargreaves Process and Mannheim Process in which potassium chloride is treated with sulfur dioxide and sulfuric acid respectively.

The guideline contractor provided treatment costs for the langbeinite process only. On the basis of these given costs, our calculations of profitability, and our estimates of the producers capability of raising prices, we do not expect any significant economic impact on the producers of potassium sulfate by the langbeinite process in meeting the standards established by the Development Document for exemplary plant, best practicable technology or best available technology treatment levels. Producers will raise prices and/or absorb costs without shutting down their facilities.

The Development Document specifies a total annual cost of $395,000 for effluent treatment for a potassium sulfate plant of 500 tons per day capacity. Total annual cost including energy and power costs are $166,000. The Development Document was prepared significantly in advance of the energy shortage and rising energy prices manifest late in 1973. Therefore, we believe that it does not accurately reflect the future costs of effluent treatment. Obviously, the document would also not reflect the capability of the langbeinite plant operators to obtain the necessary energy for effluent treatment.

2. Price Impact

As shown in our impact analysis matrix, there are a number of factors mitigating against price increases by the industry. In spite of these, which are explained in detail below, we believe that the industry will be able to pass on at least a portion of the additional pollution abatement costs incurred for effluent treatment. This belief is based on our expectation that capacity utilization is actually significantly higher than shown by examination of nominal capacity and that the two producers of potassium sulfate from langbeinite, together with the operators of the Great Salt Lake capacity, constitute a sufficiently concentrated production so as to be able to act in their own self interest and pass along additional costs incurred for pollution control.

This pricing flexibility is based on the assumption that (a) there will not be major new U.S. sources of potassium sulfate, and (b) export demand which constitutes a significant proportion of the total will not appreciably soften in future years.

a. Substitute Products

Potassium sulfate, potassium chloride, potassium magnesium sulfate, and potassium nitrate are utilized to provide potassium content for fertilizer application. Demand for potassium chloride, the lowest cost form of potassium, is far higher than for the other potassium salts. Potassium nitrate is very little used and potassium sulfate and potassium magnesium sulfate find application where farmers do not want the chloride ion provided with the use of potassium chloride. Potassium magnesium sulfate, obtained from refined langbeinites has a significantly lower potassium content than potassium sulfate but also has the additional virtue of contributing magnesium to those soils and for those crops where this is desirable.

There is some degree of flexibility of product substitution in the sense that if potassium sulfate prices change dramatically relative to the other sources of potassium, then at least some portion of the consumers of potassium sulfate would probably convert to other forms. We consider it quite unlikely, however, that the relative prices of the materials will change dramatically so as to significantly distort existing patterns of consumption.

b. Capacity Utilization

The U.S. Department of Commerce current industrial reports provide potassium sulfate shipments and production. On 100% potassium sulfate basis, 1971 production was 450,000 tons and 1972 production 402,000 tons. Nominal capacity was as follows:

POTASSIUM SULFATE NOMINAL CAPACITIES
(Thousands of Tons/Year)

		100% K_2SO_4
American Potash & Chemical (Kerr McGee)	Trona, California	65
Duval Corp. (Pennzoil United)	Carlsbad, N. Mexico*	65
IMC	Carlsbad, N. Mexico*	65
Potash Corp. of America (Ideal Basic Industries)	Dumas, Texas**	22
	Fort Worth, Texas***	22
Southwest Potash (AMAX)	Vicksburg, Mississippi	
Others (by-product)	Colorado, Texas, Ohio	20
Great Salt Lake Minerals & Chemicals (Gulf Resources & Chemical Corp--51% and Salzdefurth A.G.--49%)	Great Salt Lake, Utah	185
		527

*From langbeinite.

**Hargreaves process.

***Mannheim process.

On the basis of the capacity shown, production during 1972 was at 76% of the total available capacity. Capacity in fact is highly variable. Both Duval and IMC have probably switched some portion of their available capacity to the manufacture of potassium magnesium sulfate. In addition, Great Salt Lake Minerals & Chemicals has a varying capacity depending upon operating and weather conditions. This company's production of potassium sulfate comes from separation of the salt from brines concentrated in ponds by solar evaporation.

At the present time, there does not seem to be significant surplus capacity overhanging the market. Prices of the product are relatively firm and the market is not behaving as though competitive producers were attempting to utilize over-capacity by bidding for available business.

Two additional potential producers are Occidental Petroleum which is considering production from brines at Searles Lake and a venture by National Lead which has been attempting to develop a brine separation facility at the Great Salt Lake in Utah. The National Lead venture initially planned production of 100,000 tons per year of potassium sulfate. If the capacity for potassium sulfate extraction should be substantially increased by one or both of these producers entering the business, capacity utilization would decline significantly and inhibit opportunity for future price increases.

c. Captive Usage

All of the producers listed above distribute potassium sulfate through fertilizer distributors. IMC may also undertake direct sale to farmers. We do not believe, however, that this is a significant restraint in terms of the pricing capability of the producers.

d. Demand Growth

Shipments of potassium sulfate by U.S. producers over the past five years were as follows:

1968	321,000 tons
1969	263,000
1970	86,000
1971	483,000
1972	388,000

Over this period of time, domestic demand has apparently declined while exports have significantly increased. In the 1967-1968 fertilizer season, exports totaled 104,000 tons on a 100% K_2SO_4 basis, while imports were 61,000 tons, resulting in a net export balance of 43,000 tons. 1972 exports totaled 208,000 tons, excluding Canada, and imports totaled 59,000 tons. Thus while U.S. shipments of potassium sulfate

increased between 1968 and 1972 by about 76,000 tons, this was more than accounted for by the increase in net exports over the period of time.

Industry trade estimates suggest an increasing export market at a growth rate of better than 5% per year for the next several years. Domestic demand is expected to demonstrate little or no growth.

e. Abatement Cost Differences

There are both manufacturing cost differences and abatement cost differences among the various producers. The Hargreaves and Mannheim processes are significantly higher cost than the langbeinite process, and, we presume, they have a higher cost than the separation of brines. In the latter case, manufacturing costs will necessarily be somewhat arbitrarily defined because of the variety of co-products from any particular brine.

Abatement costs are provided by the Development Document only for a plant operating on the langbeinite process of 500 tons per day. We assume a smaller plant such as operated by Duval Corporation would have a significantly higher unit cost for pollution abatement. The separation of brine, would, we assume, have no pollution abatement costs associated with the activity, as the process is essentially the extraction of soluble salts from a natural brine.

f. Price

Producers compete on prices more than any other basis and this does impose some restraint on increasing prices. In this case, however, we believe that this effect is outweighed by other conditions involving relatively high fertilizer demand compared to active capacity and that the basis of competition will not be sufficient to restrain the recovery of additional costs through price increases.

3. Plant Shutdown Impact

The Development Document specifies only one type of treatment for effluent control to meet all technology control levels. This provides for an increase from simply pond settling of muds to evaporation and recovery of liquor chemicals and water. By our estimates, the cost of evaporation even at energy values previously assumed, constitutes approximately 16% of profits. These estimates are based on a price of \$45.90 per ton of K_2SO_4 and a manufacturing cost of \$35.00 per ton to yield a profit before taxes of around \$15.00 per ton. The increase in abatement cost suggested by the Development Document totaled \$2.37 per ton assuming 320 operating days per year. Thus while the abatement costs are significant, the profitability of the operation would appear high enough to make these tolerable even without compensating price increases.

It seems to us that the real issue facing the producers of potassium sulfate via the langbeinite process is that they will have to make the required investment in the face of additional potential competition from producers of potassium sulfate from natural brines. This additional investment, described in the Development Document, would total \$660,000 for a plant producing 500 tons per day of potassium sulfate. By our calculations, a plant this size operating at 80% of capacity and selling at current prices should be able to pay out this investment in less than one year. On the basis of these calculations, we believe the producers of potassium sulfate by the langbeinite process will not close their plants, although marketing conditions permitting, it may be more advantageous for them to shift a greater proportion of their capacity to the sale of refined langbeinite as sulfate of potash magnesium.

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16. Abstracts

An analysis of the economic impact of proposed water effluent guidelines upon 24 inorganic chemicals was performed based on water treatment cost data supplied by the EPA. The inorganic chemicals included aluminum chloride, aluminum sulfate, chlorine and caustic soda, hydrochloric acid, hydrofluoric acid, hydrogen peroxide, lime, nitric acid, sulfuric acid, calcium carbide, sodium sulfate, titanium dioxide (chloride process), titanium dioxide (sulfate process), sodium bichromate, potassium bichromate, sodium bicarbonate, solar salt, evaporated salt, sodium silicate, sodium metal, sodium sulfite, calcium chloride, synthetic soda ash, and potassium sulfate. A methodology was developed to systematically judge the broader economic effects on these chemicals, resulting from application of water effluent control, first by assessing the likelihood that treatment costs would be defrayed through price increases, and secondly, if price increases were not likely, the likelihood that plant shutdowns would occur. Based on this approach and using the treatment costs supplied, it was concluded that plant shutdowns would occur for mercury cell chlorine/caustic, lime, sludge sulfuric acid, sulfate process titanium dioxide and sodium bichromate if either best practicable technology or best available technology standards were imposed on these industries.

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Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the

MAJOR INORGANIC PRODUCTS

Segment of the Inorganic Chemicals Manufacturing

Point Source Category

MARCH 1974

U.S. ENVIRONMENTAL PROTECTION AGENCY
Washington, D.C. 20460

DEVELOPMENT DOCUMENT

for

EFFLUENT LIMITATIONS GUIDELINES

and

NEW SOURCE PERFORMANCE STANDARDS

for the

MAJOR INORGANIC PRODUCTS SEGMENT OF THE INORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY

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ABSTRACT

This document presents the findings of an extensive study of major inorganic chemicals manufacture for the purpose of developing effluent limitation guidelines for existing point sources and standards of performance and pretreatment standards for new sources to implement Sections 304, 306 and 307 of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1551, 1314, and 1316, 86 Stat. 816 et. seq.)(the "Act").

Effluent limitations guidelines contained herein set forth the degree of effluent reduction attainable through the application of the best practicable control technology currently available and the degree of effluent reduction attainable through the application of the best available technology economically achievable which must be achieved by existing point sources by July 1, 1977 and July 1, 1983, respectively. The standards of performance and pretreatment standards for new sources contained herein set forth the degree of effluent reduction which is achievable through the application of the best available demonstrated control technology, processes, operating methods, or other alternatives.

Based on the application of best practicable technology currently available 12 of the 22 chemicals under study can be manufactured with no discharge of process waste water pollutants to navigable waters. With the best available technology economically achievable 20 chemicals can be manufactured with no discharge of process waste water pollutants to navigable waters. No discharge of process waste water pollutants to navigable waters is required as a new source performance standard for all chemicals except titanium dioxide, chlorine, sodium dichromate, sodium sulfite and sodium chloride.

Supporting data and rationale for development of the effluent limitations guidelines and standards of performance are contained in this report.

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SECTION I

CONCLUSIONS

For the purpose of establishing effluent limitation guidelines and standards of performance, the major inorganic products segment of the inorganic chemicals manufacturing point source category was divided into 22 product subcategories consistent with the chemical produced. In some cases, the product subcategory was further subdivided to reflect different manufacturing processes used to produce the same chemical. This method of categorization reflects differences in the nature of raw wastes generated in the manufacture of different chemicals, as well as its treatability. Factors such as plant age, plant size and geographical location did not justify further segmentation of the industry.

Based on best practicable control technology currently available (BPCTCA), 12 of the 22 chemicals under study can be manufactured with no discharge of process waste water pollutants to navigable waters. With the application of best available technology economically achievable (BATEA), 20 of the 22 chemicals can be manufactured with no discharge of process waste water pollutants to navigable waters. No discharge of process waste water pollutants to navigable waters is, also, achievable as a new source performance standard (NSPS) based on the best demonstrated control technologies, processes, operating methods or other alternatives (BDCT) for all chemicals except titanium dioxide, chlorine, sodium dichromate, sodium sulfite, and sodium chloride.

This study included 22 of the major inorganic chemicals of SIC categories 2812, 2816, and 2819 which discharge significant quantities of process waste water pollutants into the navigable waters of the United States. A forthcoming study includes certain other inorganic chemicals and industrial gases whose annual U.S. production volume exceeds 450 kkg (500 ton) with significant waste discharge potential.

SECTION II

RECOMMENDATIONS

The effluent limitation guidelines representing the effluent reduction attainable by the application of best practicable control technology currently available and the effluent reduction attainable by the application of best available technology economically achievable are shown in Table 1. Also shown are the new source performance standards for each chemical subcategory.

The figures in the table represent the thirty-day average allowable discharge. In all cases the daily maximum is twice the thirty-day average. All process waste water discharges must be within the pH range of 6.0 - 9.0. Effluent limitation guidelines for non-contact cooling water and waste streams resulting from steam and water supply are being developed in a separate study.

The technologies on which such guidelines are based are discussed in detail in Sections III - XI, along with the rationale for selecting the various levels of technology.

Table 1. EFFLUENT LIMITATION GUIDELINES AND NEW SOURCE PERFORMANCE STANDARDS

Product Subcategory	Limitation based on BPCTCA (kg/kkg)	Limitation based on BATEA (kg/kkg)	New Source Performance Standard (kg/kkg)
Aluminum Chloride	no discharge of pwwp*	no discharge of pwwp	no discharge of pwwp
Aluminum Sulfate	no discharge of pwwp	no discharge of pwwp	no discharge of pwwp
Calcium Carbide	no discharge of pwwp	no discharge of pwwp	no discharge of pwwp
Calcium Chloride	TSS 0.0082	no discharge of pwwp	no discharge of pwwp
Calcium Oxide and Hydroxide	no discharge of pwwp	no discharge of pwwp	no discharge of pwwp
Chlorine			
a) mercury cell process	TSS 0.32 Mercury 0.00014	no discharge of pwwp	TSS 0.22 Mercury 0.00007
b) diaphragm cell process	TSS 0.32 Lead 0.0025	no discharge of pwwp	TSS 0.22 Lead detectable limit
Hydrochloric Acid	no discharge of pwwp	no discharge of pwwp	no discharge of pwwp
Hydrofluoric Acid	no discharge of pwwp	no discharge of pwwp	no discharge of pwwp
Hydrogen Peroxide			
a) organic process	TSS 0.4 TOC 0.22	no discharge of pwwp	no discharge of pwwp
b) electrolytic process	TSS 0.0025 Cyanide 0.0002	no discharge of pwwp	no discharge of pwwp
Nitric Acid	no discharge of pwwp.	no discharge of pwwp	no discharge of pwwp
Potassium Metal	no discharge of pwwp	no discharge of pwwp	no discharge of pwwp
Potassium Dichromate	no discharge of pwwp	no discharge of pwwp	no discharge of pwwp
Potassium Sulfate	no discharge of pwwp	no discharge of pwwp	no discharge of pwwp
Sodium Bicarbonate	no discharge of pwwp	no discharge of pwwp	no discharge of pwwp
Sodium Carbonate	TSS 0.27	TSS 0.10	no discharge of pwwp
Sodium Chloride			
a) solar evaporation process	uncontaminated waste bitterns may be returned to the source	same as BPCTCA	same as BPCTCA
b) solution brine-mining process	TSS 0.17	no discharge of pwwp	no discharge of pwwp
Sodium Dichromate	TSS 0.22 Cr(T) 0.0044 Cr(+6) 0.0005	no discharge of pwwp	TSS 0.15 Cr(T) 0.0044 Cr(+6) 0.0005
Sodium Metal	TSS 0.23	no discharge of pwwp	no discharge of pwwp
Sodium Silicate	TSS 0.005	no discharge of pwwp	no discharge of pwwp
Sodium Sulfite	TSS 0.016 COD 1.7 (as Cr_2O_7)	no discharge of pwwp no discharge of pwwp	TSS 0.016 COD 1.7 (as Cr_2O_7)
Sulfuric Acid	no discharge of pwwp	no discharge of pwwp	no discharge of pwwp
Titanium Dioxide			
a) chloride process	TSS 2.3 Iron 0.36	TSS 1.3 Iron 0.18	TSS 1.3 Iron 0.18
b) sulfate process	TSS 10.5 Iron 0.84	TSS 5.3 Iron 0.42	TSS 5.3 Iron 0.42

*process waste water pollutants

SECTION III

INTRODUCTION

PURPOSE AND AUTHORITY

The United States Environmental Protection Agency (EPA) is charged under the Federal Water Pollution Control Act Amendments of 1972 with establishing effluent limitations which must be achieved by point sources of discharge into the navigable water of the United States.

Section 301(b) of the Act requires the achievement, by not later than July 1, 1977, of effluent limitations for point sources, other than publicly owned treatment works, which are based on the application of the best practicable control technology currently available as defined by the Administrator pursuant to Section 304(b) of the Act. Section 301(b) also requires the achievement by not later than July 1, 1983, of effluent limitations for point sources, other than publicly owned treatment works, which are based on the application of the best available technology economically achievable which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Administrator pursuant to Section 304(b) of the Act. Section 306 of the Act requires the achievement by new sources of a Federal standard of performance providing for the control of the discharge of pollutants which reflects the greatest degree of effluent reduction which the Administrator determines to be achievable through the application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants. Section 304(b) of the Act requires the Administrator to publish within one year of enactment of the Act, regulations providing guidelines for effluent limitations setting forth the degree of effluent reduction attainable through the application of the best practicable control technology currently available and the degree of effluent reduction attainable through the application of the best control measures and practices achievable including treatment techniques, process and procedure innovations, operation methods and other alternatives. The regulations proposed herein set forth effluent limitations guidelines pursuant to Section 304(b) of the Act for the inorganic chemicals manufacturing point source category.

Section 306 of the Act requires the Administrator, within one year after a category of sources is included in a list published pursuant to Section 306(b) (1) (A) of the Act, to propose regulations establishing Federal standards of performance for new sources within such categories. The Administrator published in the Federal Register of January 16, 1973 (38 F.R. 1624), a list

of 27 point source categories. Publication of the list constituted announcement of the Administrator's intention of establishing, under Section 306, standards of performance applicable to new sources within the inorganic chemicals manufacturing point source category, which was included within the list published January 16, 1973.

SUMMARY OF METHODS USED FOR DEVELOPMENT OF EFFLUENT LIMITATION GUIDELINES AND STANDARDS OF PERFORMANCE

The Environmental Protection Agency has determined that a rigorous approach including plant surveying and verification testing is necessary for the development of effluent standards for industrial sources. A systematic approach to develop the required guidelines and standards includes the following:

(a) Categorization of the industry and determination of those industrial categories for which separate effluent limitations and standards need to be set;
(b) Characterization of the waste loads resulting from discharges within industrial categories and sub-categories;
(c) Identification of the range of control and treatment technology within each industrial category and subcategory;
(d) Identification of those plants employing the best practical technology currently available (exemplary plants); and
(e) Generation of supporting verification data for the best practical technology including actual sampling of plant effluents by field teams.

The culmination of these activities is the development of the guidelines and standards based on the best practicable technology currently available.

This report describes the results obtained from application of the above approach to the inorganic chemicals industry. Thus, the survey and testing covered a wide range of processes, products, and types of wastes. Studies of a total of twenty-five chemicals listed below are summarized in this Document.

Selected Inorganic Chemicals

Aluminum Chloride	Potassium Sulfate
Aluminum Sulfate	Sodium Bicarbonate
Calcium Carbide	Sodium Carbonate (Soda Ash)
Calcium Chloride	Sodium Chloride
Chlorine	Sodium Dichromate
Hydrochloric Acid	Sodium Hydroxide
Hydrogen Peroxide	Sodium Metal

Hydrofluoric Acid	Sodium Silicate
Calcium Oxide and Calcium Hydroxide	Sodium Sulfate
Nitric Acid	Sodium Sulfite
Potassium Chromates	Sulfuric Acid
Potassium Hydroxide	Titanium Dioxide
Potassium Metal	

The effluent limitation guidelines for existing point sources and standards of performance for new facilities were developed in the following manner. The point source category was first categorized for the purpose of determining whether separate limitations and standards are appropriate for different segments within a point source category. Such subcategorization was based upon raw material used, product produced, manufacturing process employed, and other factors. The raw waste characteristics for each subcategory were then identified. This included an analysis of (1) the source and volume of water used in the process employed and the sources of waste and waste waters in the plant; and (2) the constituents of all waste waters which result in degradation of the receiving water. The constituents of waste waters which should be subject to effluent limitations guidelines and standards of performance were identified.

The full range of control and treatment technologies existing within each subcategory was identified. This included an identification of each control and treatment technology, including both inplant and end-of-process technologies, which are existent or capable of being designed for each subcategory. It also included an identification of the quantity of constituents (including thermal) and the characteristics of pollutants resulting from the application of each of the treatment and control technologies. The problems, limitations and reliability of each treatment and control technology were also identified. In addition, the non-water quality environmental impact, such as the effects of the application of such technologies upon other pollution problems, including air, solid waste, noise and radiation were also identified. The energy requirements of each of the control and treatment technologies were identified as well as the cost of the application of such technologies.

Cost information contained in this report was obtained directly from industry during exemplary plant visits, from engineering firms and equipment suppliers, and from the literature. The information obtained from the latter three sources has been used to develop general capital, operating and overall costs for each treatment and control method. Costs have been put on a consistent industrial calculation basis of ten year straight line depreciation, plus allowance for interest at six percent per year (pollution abatement tax free money) and inclusion of allowance for insurance and taxes for an overall fixed cost amortization of fifteen percent per year. This generalized cost data, plus the

specific information obtained from plant visits, was then used for cost effectiveness estimates in Section VIII and wherever else costs are mentioned in this Document.

The data for identification and analyses were derived from a number of sources. These sources included EPA research information, published literature, qualified technical consultation, on-site visits and interviews at numerous inorganic chemical plants throughout the U.S., interviews and meetings with various trade associations, and interviews and meetings with various regional offices of the EPA. All references used in developing the guidelines for effluent limitations and standards of performance for new sources reported herein are included in Section XIII.

Exemplary plant selection

Eleven corporate headquarters were initially consulted for assistance in preparing a list of potentially exemplary plants. Eighty plants were studied in depth by consultations and review of plant data. Of these, sixty plants were visited for additional screening and data collection. Twenty-eight plants were then visited and sampled by the contractor. This sampling included all of the chemical processes subject to effluent limitations guidelines. The following criteria were developed and used for the selection of exemplary plants.

(a) Discharge effluent quantities

Plants discharging small quantities of pollutants or no process waste water pollutants were preferred. This minimal discharge may be due to reuse of water, raw material recovery and recycling, or good water conservation. The significant parameter was minimal waste added to effluent streams per weight of product manufactured.

(b) Water management practices

Use of good management practices such as water reuse, planning and in-plant water segregation, and the proximity of cooling towers to operating units, where airborne contamination of water can occur, were considered.

(c) Land utilization

The efficiency of land use was considered.

(d) Air pollution and solid waste control

Exemplary plants must possess overall effective air and solid waste pollution control in addition to water pollution control technology. Care was taken to insure that all plants chosen have

minimal discharges into the environment and that exemplary sites are not those which are exchanging one form of pollution for another of the same or greater magnitude.

(e) Effluent treatment methods and their effectiveness

Plants selected generally have in use the best currently available treatment methods, operating controls, and operational reliability. Treatment methods considered included basic process modifications which significantly reduce effluent loads as well as conventional end-of-pipe treatment methods.

(f) Plant facilities

All plants chosen as exemplary had all the facilities normally associated with the production of the specific chemical(s) in question. These facilities, generally, were plants which have all their normal process steps carried out on-site.

(g) Plant management philosophy

Plants were preferred whose management insists upon effective equipment maintenance and good housekeeping practices. These qualities are best identified by a high operational factor and plant cleanliness.

(h) Diversity of processes

On the basis that all of the above criteria are met, consideration was given to installations having a multiplicity of manufacturing processes. However, for sampling purposes, the complex facilities chosen were those for which the wastes could be clearly traced through the various treatment steps.

(i) Product purity

For cases in which purity requirements play a major role in determining the amounts of wastes to be treated and the degree of water recycling possible, different product grades were considered for sub-categorization.

Sampling of Exemplary Plants

The details of how the exemplary plants were sampled and the analytical techniques employed are fully discussed in Section V.

GENERAL DESCRIPTION OF THE INDUSTRY

Brief descriptions of each of the twenty-two chemical subcategories are presented below. Process flow sheets for the various subcategories are included. Production tonnages reported for 1971 were taken from Current Industrial Reports, Inorganic

Chemicals, U.S. Bureau of Census, Series M28A(71)-14.(1) These values are summarized in Table 2. Also included are production tonnages for years prior and subsequent to 1971, where available, and the number of plants producing each chemical.

Aluminum Chloride

The anhydrous product is produced by the reaction of gaseous chlorine with molten aluminum metal (scrap or scrap-pig mixture). The basic equation is:

$$2Al + 3Cl_2 \quad 2AlCl_3$$

Chlorine is introduced below the surface of the molten aluminum. The product sublimes and is collected by condensation. There are three types of products manufactured, all from the same general process:

(1) Yellow - this product is made using a slight excess of chloride (0.0005 percent) and may contain some iron due to reaction of the chloride with the vessel;
(2) White - this product has a stoichoimetric aluminum and chlorine starting ratio; and
(3) Grey - this product contains 0.01 percent excess aluminum. The unreacted aluminum raw waste load is higher for this grey material.

In most cases it makes little difference which of the above grades is employed. In some pigment and dye intermediate applications, the yellow material is preferred because it is free of elemental aluminum.

Aluminum chloride is also made from the reaction of bauxite, coke and chlorine. About 80 percent of all aluminum chloride made is anhydrous. A solution grade of aluminum chloride is also produced by reacting hydrated aluminum or bauxite ore with hydrochloric acid. A standard process diagram is shown in Figure 1.

Annual U.S. production in 1971 totalled 26,399 kkg (29,100 tons). The major use is as a catalyst in the petrochemical and synthetic polymer industries.

The 1971 production for the 28 percent solution product was 7,650 kkg (8,400 tons).

Aluminum Sulfate

Aluminum sulfate is produced by the reaction of bauxite ore, or other aluminum-containing compounds, with concentrated sulfuric acid (60°Be). The general equation of the reaction is:

$$Al_2O_3 \cdot 2H_2O + 3H_2SO_4 \rightarrow Al_2(SO_4)_3 + 5H_2O$$

TABLE 2. U.S. Production of Inorganic Chemicals (Metric Tons)

	1973 (Est.)	1972	1971	1970	1969	No. of Plants (1971)
$AlCl_3$		30,844	26,399	28,485	35,834	5
$Al_2(SO_4)_3$		1,019,670	1,084,080	1,080,451	1,136,696	100
CaC_2		447,240	566,988	717,579	776,546	7
$CaCl_2$		861,821	1,100,409	1,006,000	1,066,843	9
$Cl_2(g)$	9,480,031	8,952,052	8,483,947	8,857,700	7,801,748	63
HCl	2,131,873	1,996,703	1,904,171	1,827,060	1,733,621	83
HF		301,184	199,126	203,571	200,940	13
H_2O_2		68,039	58,060	55,338	58,967	5
Lime					15,422,060	97
HNO_3	6,731,276	6,369,311	6,116,208	6,059,055	5,844,960	72
$K_2Cr_2O_7$		(Estimated)4,309				2
KOH		161,478	179,622	158,756	160,570	13
K	91		59	285		1
K_2SO_4			407,959	296,285	277,143	7
$NaHCO_3$			158,756	129,727	124,284	5
Na_2CO_3, total		6,768,470	6,396,526		6,350,260	13
Synthetic	3,991,592	3,929,904	3,878,194	3,985,242	4,118,597	7
NaCl					39,008,740	85
NaCl (Solar)			2,350,000			6
NaCl (Solution Mining)			5,928,000			?
$Na_2Cr_2O_7$ (& Chromate)		124,284	125,191	139,706	138,798	6
NaOH	9,797,544	9,196,084	9,276,006	9,199,712	8,996,504	62
Na			138,799	155,128	149,685	5
Sodium Silicate		601,460	569,709	569,709	596,017	33
Na_2SO_4		1,236,486	1,230,136	1,245,558	1,341,719	40
Na_2SO_3			185,065	222,259	205,930	6
H_2SO_4	29,664,786	27,257,130	26,691,000	26,784,489	26,795,375	150
TiO_2	644,098	623,233	615,068	594,203	602,367	14

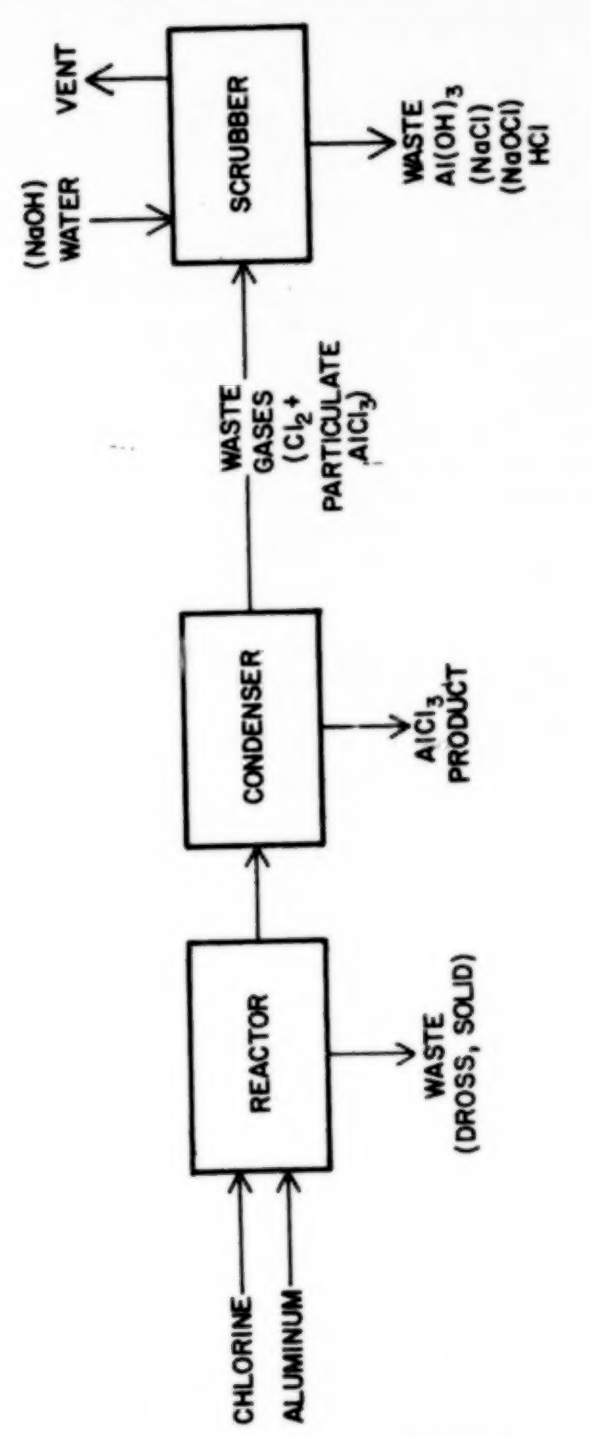

FIGURE 1
STANDARD
ALUMINUM CHLORIDE FLOW DIAGRAM

Ground ore and acid are reacted in a digester, from which the products, aluminum sulfate in solution plus muds and other insoluble materials from the ore, are fed into a settling tank. The aluminum sulfate solution is then clarified and filtered to remove any remaining insolubles. It may be sold as solution or evaporated to yield a solid product. A typical process diagram is shown in Figure 2.

Annual U.S. production in 1971 was 1,084,080 kkg (1,195,000 tons). Aluminum sulfate, or filter alum, is used for water treatment (flocculation and clarification) and in treatment of paper mill waste, sewage, and other waste streams.

Calcium Carbide

This chemical is prepared by the reaction of calcium oxide with carbon (in the form of coke, petroleum coke, or anthracite) at 2000-2200°C (3632-3992°F) in a furnace similar to the familiar arc furnace, as shown in Figure 3. The general equation for the reaction is:

$$2CaO + 4C + Heat \longrightarrow 2CaC_2 + O_2$$

Calcium carbide is used primarily in the manufacturing of acetylene (by reaction with water). This use and the tonnage production has been steadily decreasing. Still, many calcium carbide plants are located in conjunction with acetylene plants. Since the production process is dry, the only major discharges are those effluents from scrubbing furnace and kiln offgases. The U.S. production in 1971 was 567,182 kkg (625,338 tons).

Calcium Chloride

Most of the calcium chloride produced is extracted from impure natural brines, but some of this salt is recovered as a by-product of soda ash manufacture by the Solvay process. In the manufacturing of calcium chloride from brine, the salts are solution mined and the resulting brines are first concentrated to remove sodium chloride by precipitation and then purified by the addition of other materials to precipitate sodium, potassium, and magnesium salts. The purified calcium chloride brine is then evaporated to yield a wet solid which is flaked and calcined to a dry solid product. Extensive recycling of partially purified brine is used to recover most of the sodium chloride values. A standard process diagram is shown in Figure 4.

Manufacture of calcium chloride from Solvay process waste liquors is similar to the natural brine process, except that the stepwise concentration and purification is unnecessary because no magnesium is present. Evaporation and calcining procedures are similar to those above. Significant wastes result from calcium chloride manufacturing.

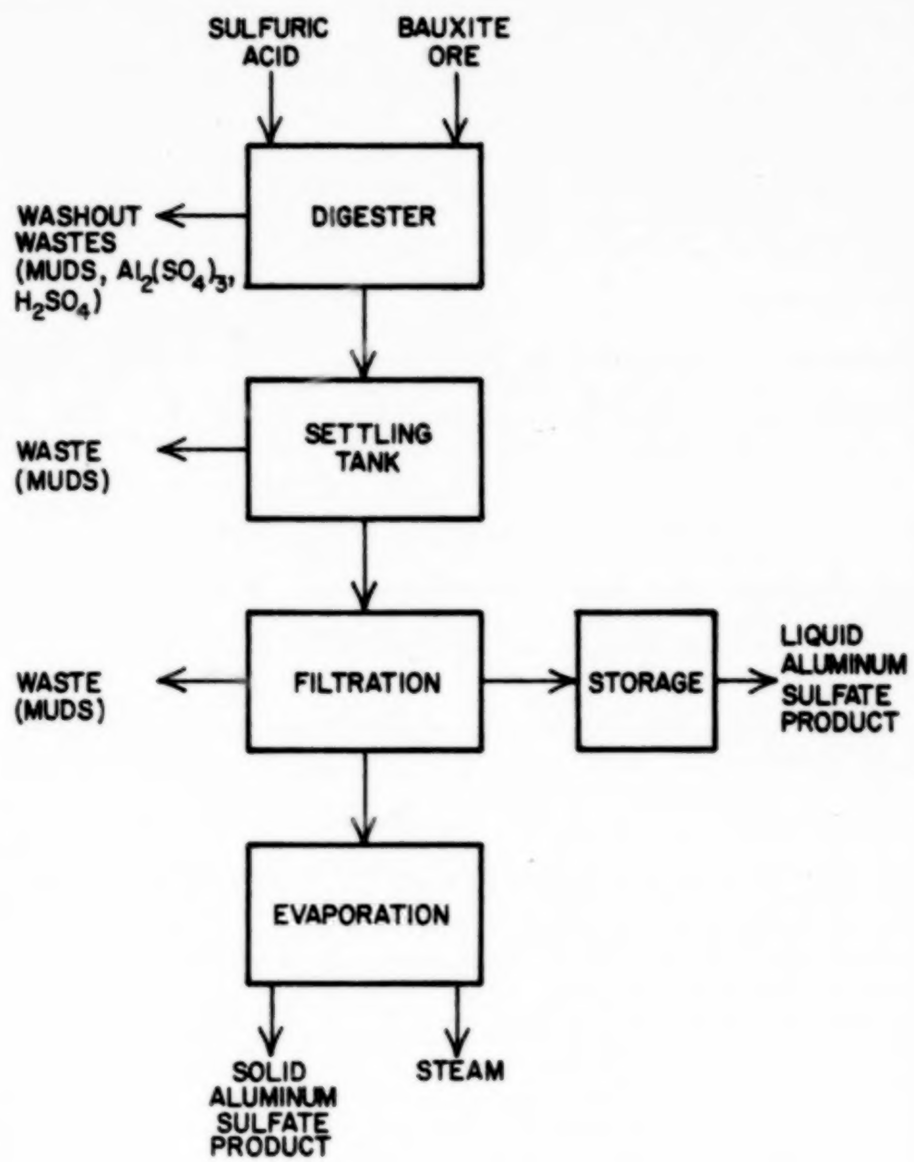

FIGURE 2
STANDARD PROCESS DIAGRAM FOR ALUMINUM SULFATE MANUFACTURE

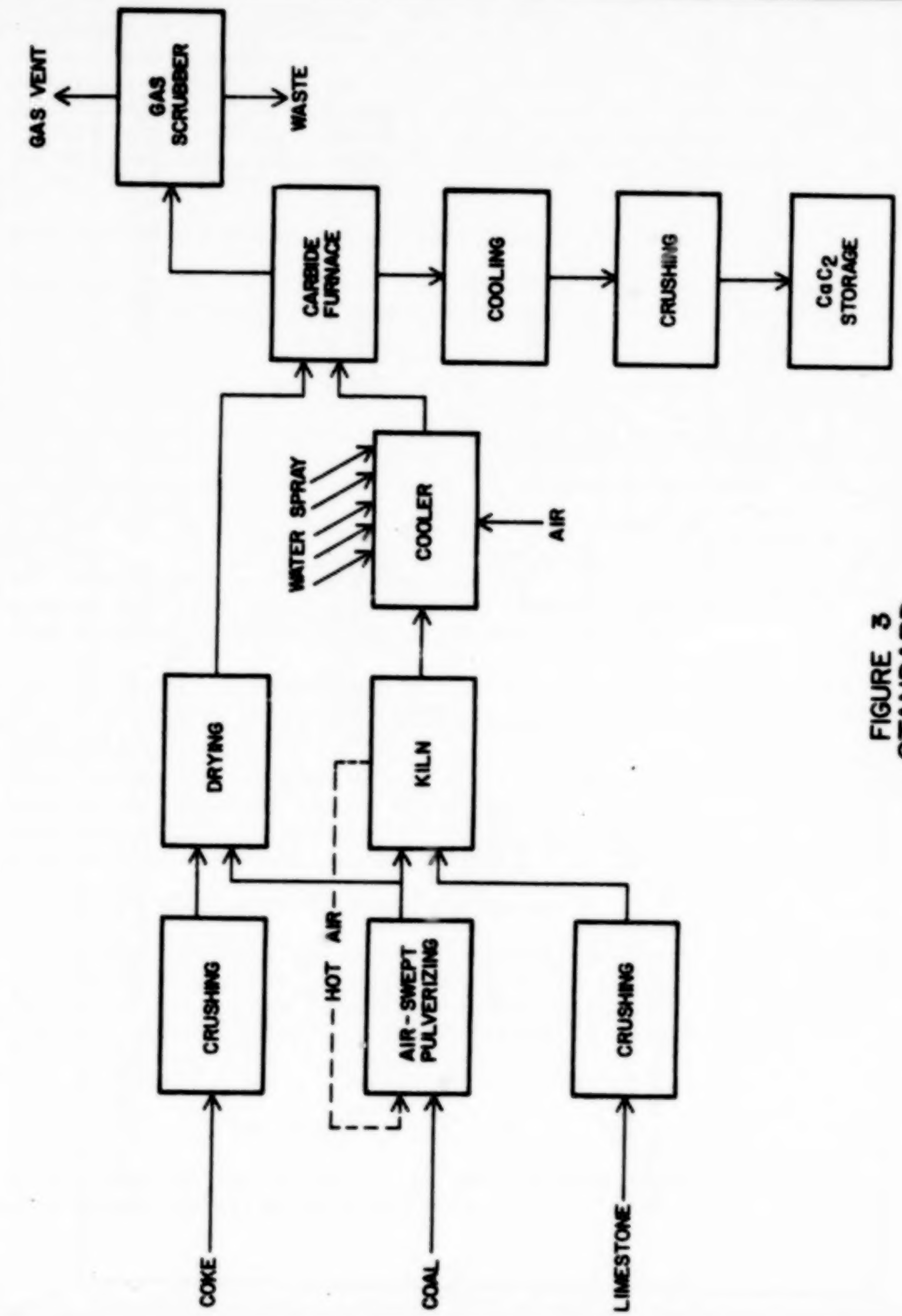

FIGURE 3
STANDARD
CALCIUM CARBIDE FLOW DIAGRAM

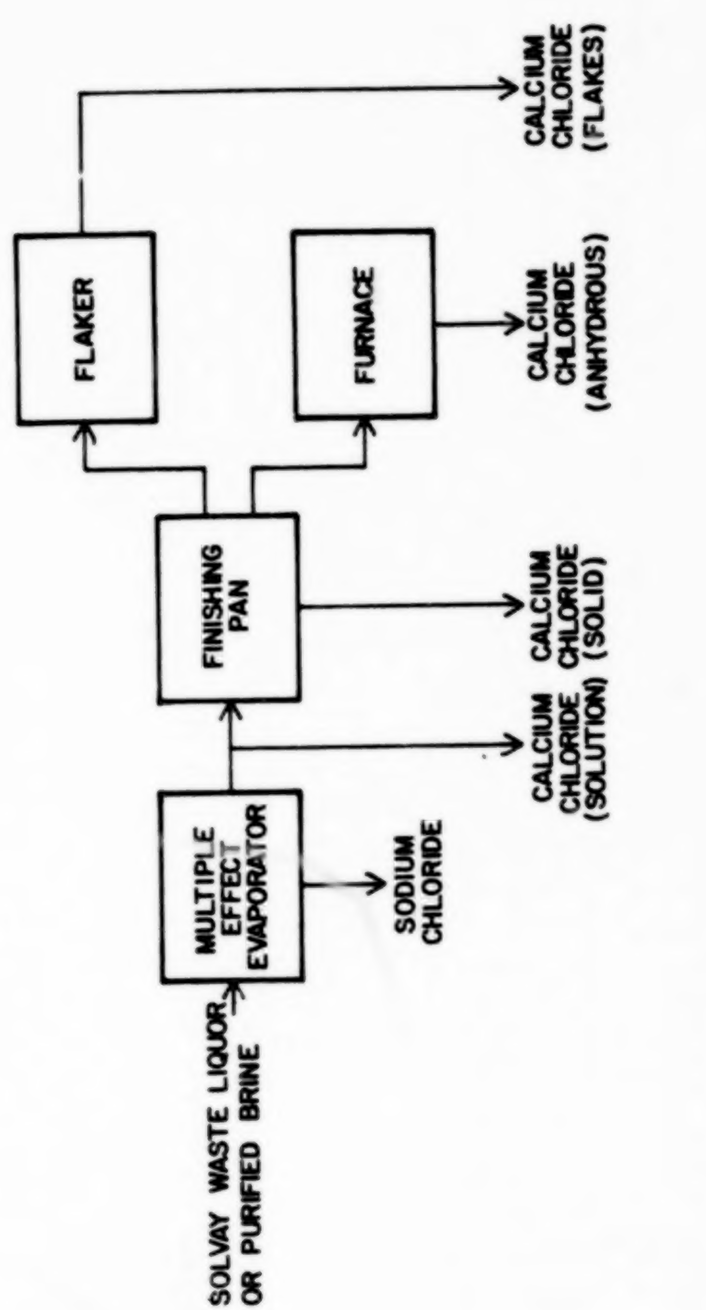

FIGURE 4
STANDARD PROCESS FOR CALCIUM CHLORIDE MANUFACTURE

In 1971, U.S. production of calcium chloride was 1,101,281 kkg (1,213,000 tons). Uses include de-icing of roads, use as a stabilizer in pavement and cement, and dust control on roads. Production is increasing as more uses and markets are found, but potential production capability is much greater than that presently utilized. Recently, increased recovery resulting from pollution abatement measures has tended to cause calcium chloride supply to exceed demand. Plants recovering this salt from natural brines are located near mixed salt deposits, such as those in Michigan, West Virginia, and California.

Calcium Oxide and Calcium Hydroxide

Calcium oxide is produced by calcining various types of limestone in a continuous vertical or rotary kiln. The general equation for the reaction is:

$$CaCO_3 + Heat \rightarrow CaO + CO_2$$

Formerly coal or coke was used as fuel in vertical kilns, but in recent years large gas-fired kilns have been widely used. After calcination, the calcium oxide is cooled and then packaged or crushed and screened to yield a pulverized product. It may be slaked by reaction with water to yield calcium hydroxide and then marketed. The only waterborne wastes result from wet scrubbing of the gaseous kiln effluent to remove particulates. These wastes are high pH liquors which also contain suspended solids. The standard process diagram is shown in Figure 5.

Annual U.S. production of lime is believed to total about 16,000,000 kkg (17,600,000 tons). Approximately 20 percent of this production is "captive" (made and consumed in the same facility), primarily in the sugar, alkali, and steel industries. The remainder finds a variety of chemical and industrial uses, including use as an alkali and use in hydrated lime manufacturing. Principal growth areas appear to be in basic oxygen steel production and in soil stabilization.

Chlorine, Sodium or Potassium Hydroxide

The major chlorine production results from the electrolysis of sodium or potassium chloride brines, in which caustic soda (NaOH) or caustic potash (KOH), respectively, are also produced. The general equation for the electrolysis is (where M can be either Na or K):

$$3\ MCl + 2H_2O \xrightarrow{dc} Cl_2 + 2MOH + H_2$$

From the above equation it can be seen that hydrogen is also a by-product of brine electrolysis.

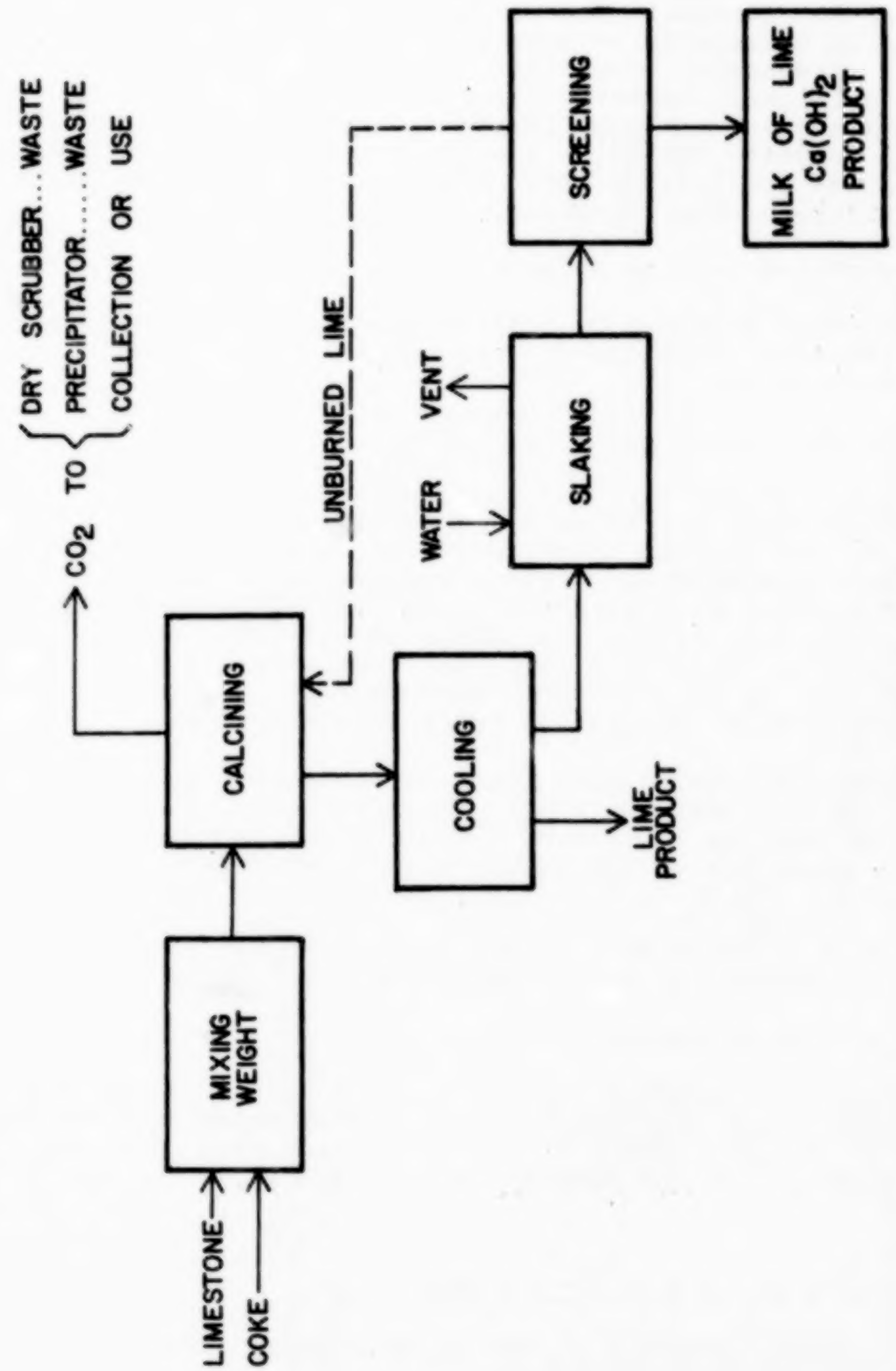

FIGURE 5
STANDARD
CALCIUM OXIDE (LIME) FLOW DIAGRAM

Other sources (minor in size) of chlorine include the manufacture of hydrochloric acid and metallic sodium.

Two types of electrolysis cells are used, mercury cells and diaphragm cells.

a) Diaphragm cell process

In the diaphragm cell process, Figure 6, sodium chloride brines are first purified by addition of sodium carbonate, lime flocculating agents and barium carbonate in the amounts required to precipitate all the magnesium, calcium and sulfate contents of the brine. The brine is filtered to remove the precipitated materials and is then electrolyzed in a diaphragm cell. Chlorine, formed at one electrode, is collected, cooled, dried with sulfuric acid, then purified, compressed, liquified and shipped. At the other electrode, sodium hydroxide is formed and hydrogen is liberated. The hydrogen is cooled, purified, compressed and sold and the sodium hydroxide formed, along with unreacted brine, is then evaporated at 50 percent concentration. During partial evaporation, most of the unreacted sodium chloride precipitates from the solution, which is then filtered. The collected sodium chloride is recycled to the process and the sodium hydroxide solutions are sold or further evaporated to yield solid products.

In cases where potassium hydroxide is manufactured as a co-product with chlorine, purified potassium chloride is used instead of sodium chloride as the starting material. Otherwise, the process is identical.

b) Mercury cell process

Figure 7 shows a standard process diagram for sodium hydroxide and chlorine production by the mercury cell process. The raw material salt, is dissolved and purified by addition of barium chloride, soda ash, and lime to remove magnesium and calcium salts and sulfates prior to electrolysis. The insolubles formed on addition of the treatment chemicals are filtered from the brine and the brine is fed to the mercury cell, wherein chlorine is liberated at one electrode and a sodium-mercury amalgam is formed at the other.

Mercury cells utilize mercury flowing along the bottom of a steel trough as the cathode. A multiple anode is comprised of horizontal graphite plates. Upon electrolysis the alkali metal forms an amalgam with the mercury. The amalgam is decomposed externally to the cell by the addition of water, which results in the formation of hydrogen.

The chlorine gas from the cells is collected, cooled, dried by contact with sulfuric acid, and then purified and liquified for

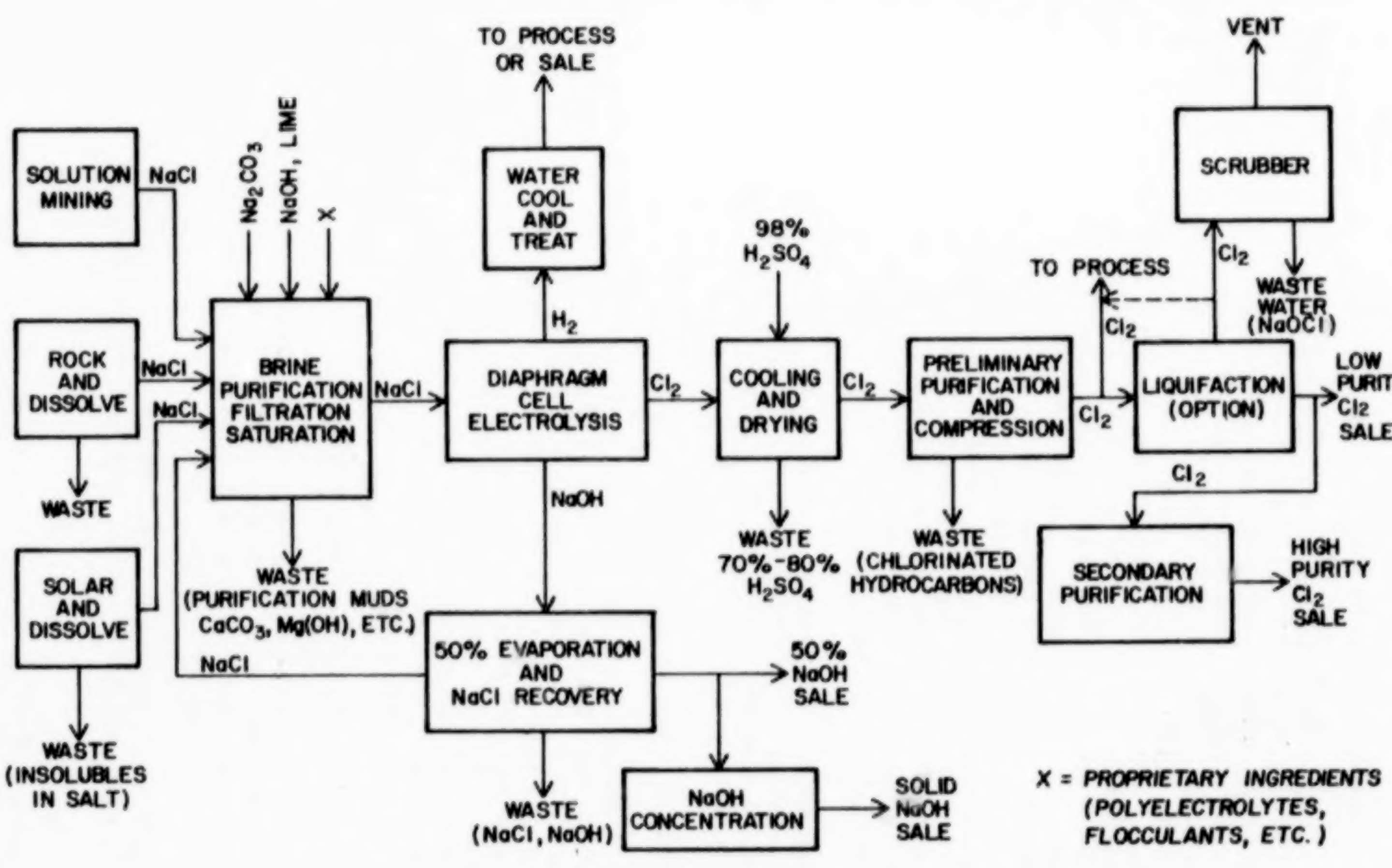

FIGURE 6
STANDARD
CHLORINE-CAUSTIC SODA FLOW DIAGRAM - DIAPHRAGM CELL PROCESS

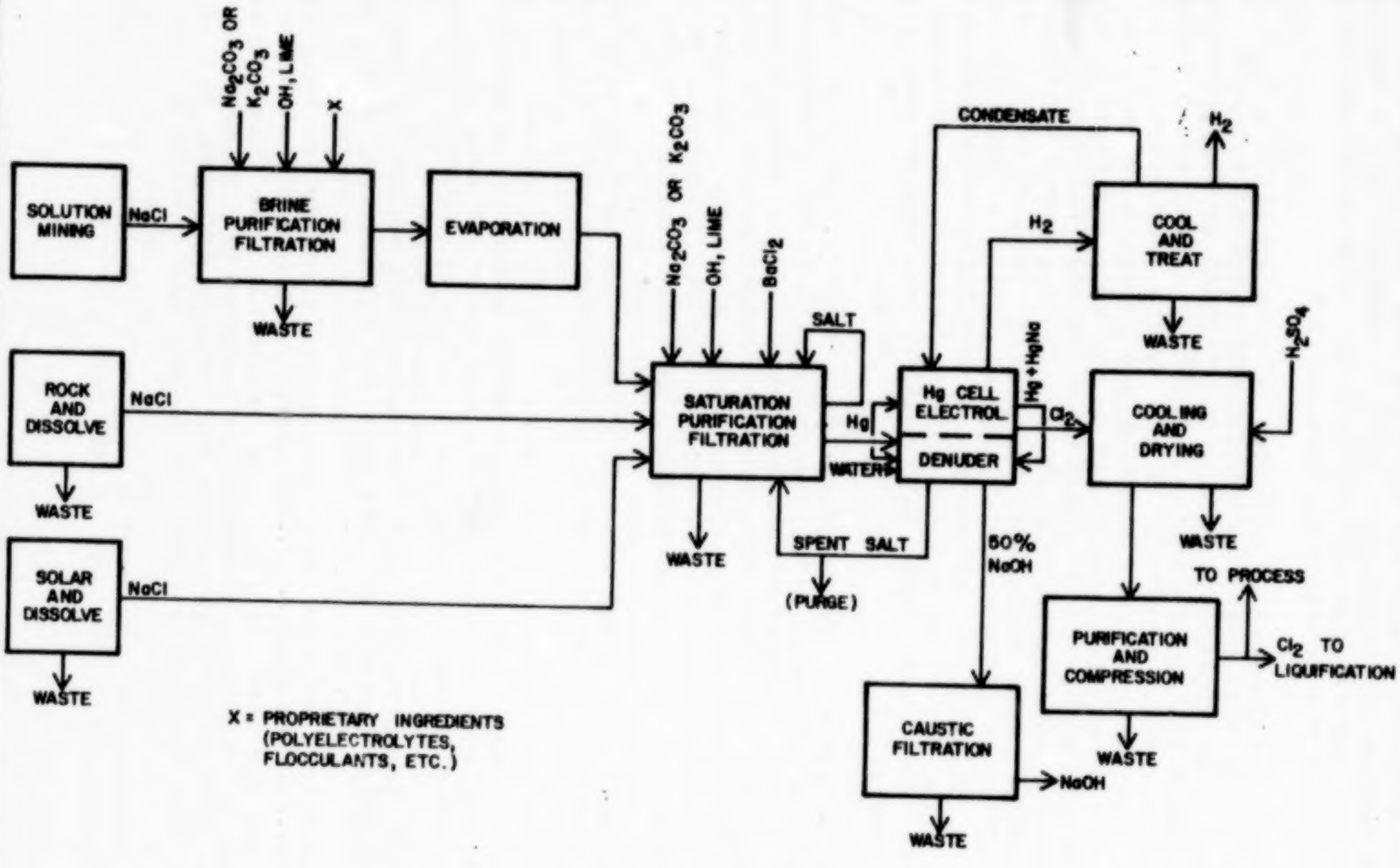

FIGURE 7
STANDARD
CHLORINE-CAUSTIC FLOW DIAGRAM MERCURY CELL PROCESS

shipment, utilized on-site, or sold as gaseous chlorine. Much of the unreacted salt in the brine is recycled. Besides potential caustic and brine effluents some mercury is present in the spent brine from the mercury cell process. The cost of removing mercury from the effluent accounts, to some extent, for the shift back toward the diaphragm cells. Mercury cells began to be widely used in the early 1950's and reached a high of almost 30 percent of the total production in 1968.

The U.S. production of chlorine in 1971 totalled 8,482,660 kkg of gas (9,352,437 tons) and 4,035,489 kkg of liquid (4,449,271 tons). At present, about 75 percent of the production is in diaphragm cells, 20 percent in mercury cells, and 5 percent from other sources. About two-thirds of the production is utilized in the synthetic organic chemical and plastics industries, and half of that remaining is utilized in the pulp and paper industry (as a bleaching agent). Other uses include the inorganic chemicals industry, municipal water and sewage treatment, and many others. Somewhat over half of the total production is "captive", primarily in the synthetic organic chemicals and the pulp and paper industries. In recent years proximity to markets has been the major factor in chlorine plant location, in contrast to the cost of power and salt which previously dominated plant economics.

Sodium hydroxide is produced from the electrolysis of sodium chloride brines in mercury or diaphragm cells as described above. The caustic solution from the cathode of the electrolysis cell is evaporated to about 50 percent by weight sodium hydroxide. This may be sold as "standard-grade caustic liquor", concentrated to 73 percent, or further refined through removal of chloride and chlorate by various techniques. Refined caustic liquor may be sold, further concentrated to 73 percent solids, or evaporated to dryness. The anhydrous sodium hydroxide is sold in solid (flake or powdered) forms. Most of the product is sold in the liquid form.

Caustic soda has many varied uses, mostly as an alkali. It has also replaced soda ash (sodium carbonate) in many uses, such as in the aluminum industry and in other molten salt processes. It is used to manufacture soda ash in one plant. In 1971, the U.S. production of sodium hydroxide was 8,780,946 kkg (9,681,397 tons) in liquid form and 493,393 kkg (543,983 tons) in solid form.

Production methods for potassium hydroxide are very similar to those for sodium hydroxide, except that mined potassium chloride brines are used as the raw material. In the mercury cell process, the potassium-mercury amalgam is decomposed with water. The mercury is recycled and the caustic solution is cooled and filtered to recover potassium hydroxide.

The U.S. production of potassium hydroxide in 1971 was 179,760 kkg (198,192 tons). Caustic potash is used as an alkali, particularly when very high purity is desired or where other factors allow it to compete with sodium hydroxide (captive production, for instance). Other uses include the manufacturing of potassium salts and organic compounds containing potassium.

Hydrochloric Acid

There are two major processes used for hydrochloric acid manufacture. The process considered in this Document, as shown in Figure 8, is direct reaction of chlorine with hydrogen by:

$$Cl_2 + H_2 \rightarrow 2HCl$$

The second major source of production for hydrochloric acid, as a by-product of organic chlorination reactions, is the dominant source. This process is beyond the scope of this Document. By-product hydrochloric acid is typically of lower purity than that produced by direct reaction.

In the production of hydrochloric acid by direct reaction, hydrogen and chlorine gases are reacted in a vertical burner. The product hydrogen chloride so formed is cooled and then absorbed in water. Exhaust gases are scrubbed, and acid values are recycled. End products may include strong acid (22°Be) from the cooler, weak acid (18°Be) from the absorber column, a mixture of these (20°Be), or anhydrous HCl. The anhydrous acid may be prepared by stripping gaseous HCl from strong acid. The condensate and column bottoms from this process may then be recycled back into the hydrochloric acid recovery process.

Approximately 90 percent of the current production is byproduct, and supply often exceeds demand. Uses include pickling of steel, chlorination reactions (in place of chlorine), and a variety of uses as an acid agent. Total U.S. production in 1971 was 1,904,075 kkg (2,099,371 tons).

Hydrofluoric Acid

Hydrofluoric acid is obtained by reacting the mineral fluorspar (CaF_2) with concentrated sulfuric acid in a furnace, as shown in Figure 9. The general reaction for this process is:

$$CaF_2 + H_2SO_4 + Heat \rightarrow H_2F_2 + CaSO_4$$

The hydrofluoric acid leaves the furnace as a gas, which is then cooled and absorbed in water prior to purification. In the purification system, the crude acid is redistilled and either absorbed in water to yield aqueous hydrofluoric acid or compressed and bottled for sale as anhydrous hydrofluoric acid. Final drying of the anhydrous gas is accomplished with

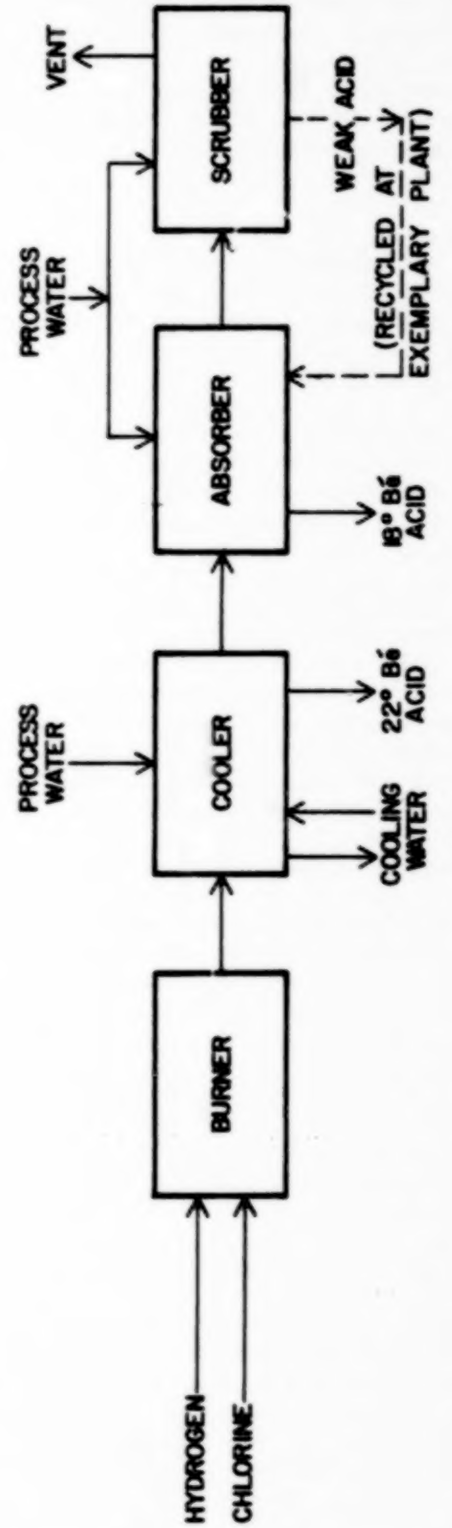

FIGURE 8
STANDARD
HYDROCHLORIC ACID FLOW DIAGRAM (SYNTHETIC PROCESS)

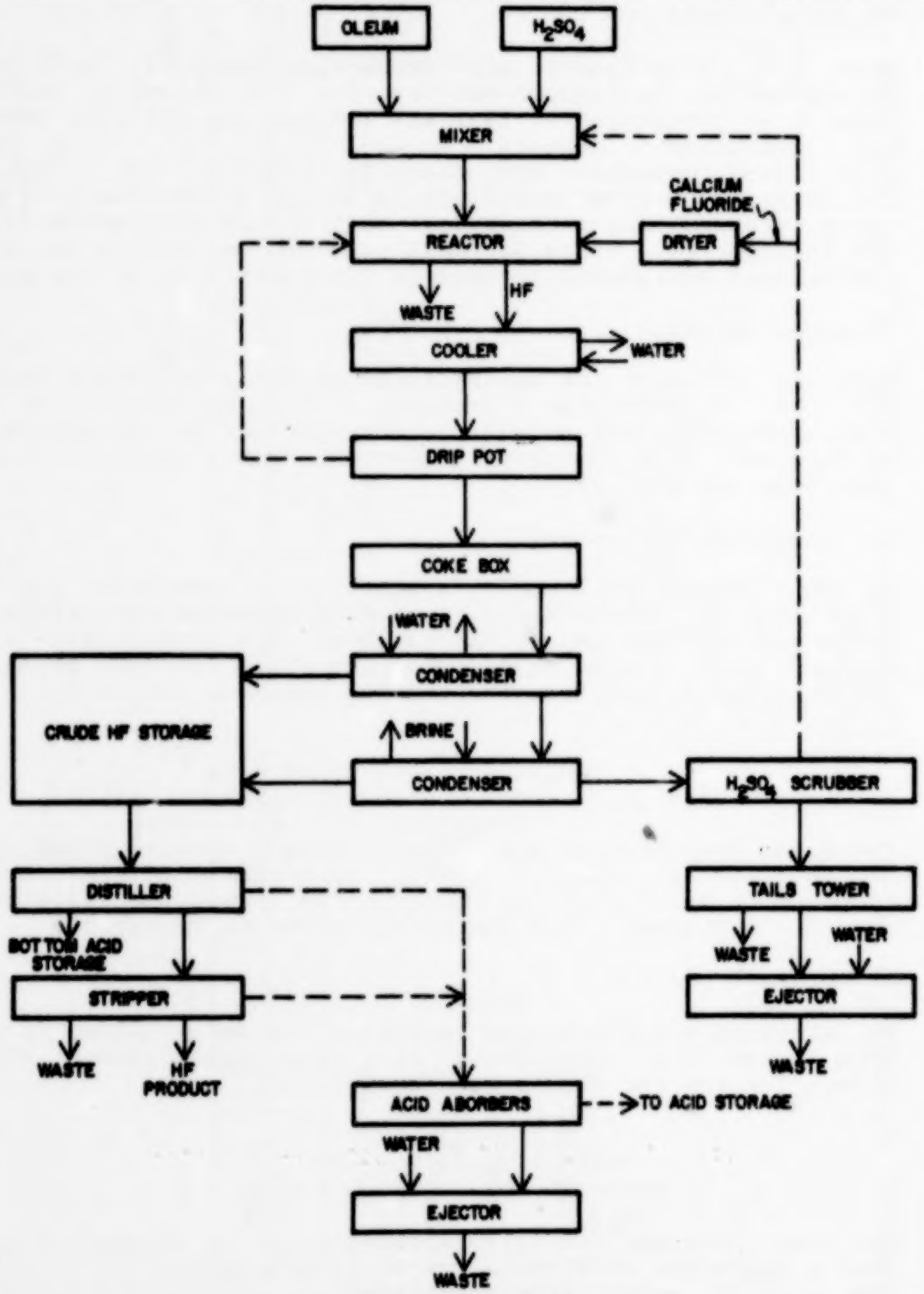

FIGURE 9
HYDROFLUORIC ACID FLOW DIAGRAM

concentrated sulfuric acid. Aqueous acid is normally shipped as 70 percent acid.

Most U.S. hydrofluoric acid production (probably 75-80 percent) is captive to the fluorinated organics and plastics industries. Total U.S. production in 1971 was 199,069 kkg (219,481 tons), and the production appears to be increasing fairly rapidly. Fluorinated organics and plastics comprise the major use industries. Another major use is in the production of synthetic cryolite and aluminum fluoride. Most of the acid-grade fluorspar ore is imported. Waste disposal problems and safety hazards are specialized and severe because of the reactivity of the material.

Hydrogen Peroxide

Hydrogen peroxide is manufactured by three different processes: (1) An electrolytic process; (2) Oxidation of alkyl hydroanthraquinones; and (3) As a by-product in the manufacturing of acetone from isopropyl alcohol. This Document includes processes (1) and (2).

a) Electrolytic process

In the electrolytic process, a solution of ammonium (or other) bisulfate is electrolyzed, yielding ammonium persulfate at the anode and hydrogen gas at the cathode. The persulfate is then reacted with water (hydrolyzed) to yield hydrogen peroxide and the original bisulfate. The general reaction scheme is:

$$2NH_4HSO_4 \xrightarrow{dc} (NH_4)_2S_2O_8 + H_2$$
$$(NH_4)_2S_2O_8 + H_2O \longrightarrow 2NH_4HSO_4 + H_2O_2$$

The crude peroxide product emerges mixed with water, and can be concentrated to desired levels by vacuum distillation or low-temperature fractionation. The cathode liquor is filtered and reused. A standard flow diagram is shown in Figure 10.

b) Organic process

The alkylhydroanthraquinone oxidation process is shown in general form below ("R" represents the alkylanthraquinone molecule, except for the two double-bonded oxygens):

$$O{=}R{=}O + H_2 \xrightarrow{Cat.} HO{-}R{-}OH$$
$$HO{-}R{-}OH + O_2 \longrightarrow O{=}R{=}O + H_2O_2$$

In this process, the alkylanthraquinone is reduced by hydrogen over a supported metal catalyst (typically palladium on alumina), the product being the corresponding alkylhydroanthraquinone. This, in turn, is oxidized by oxygen in a forced gas stream to

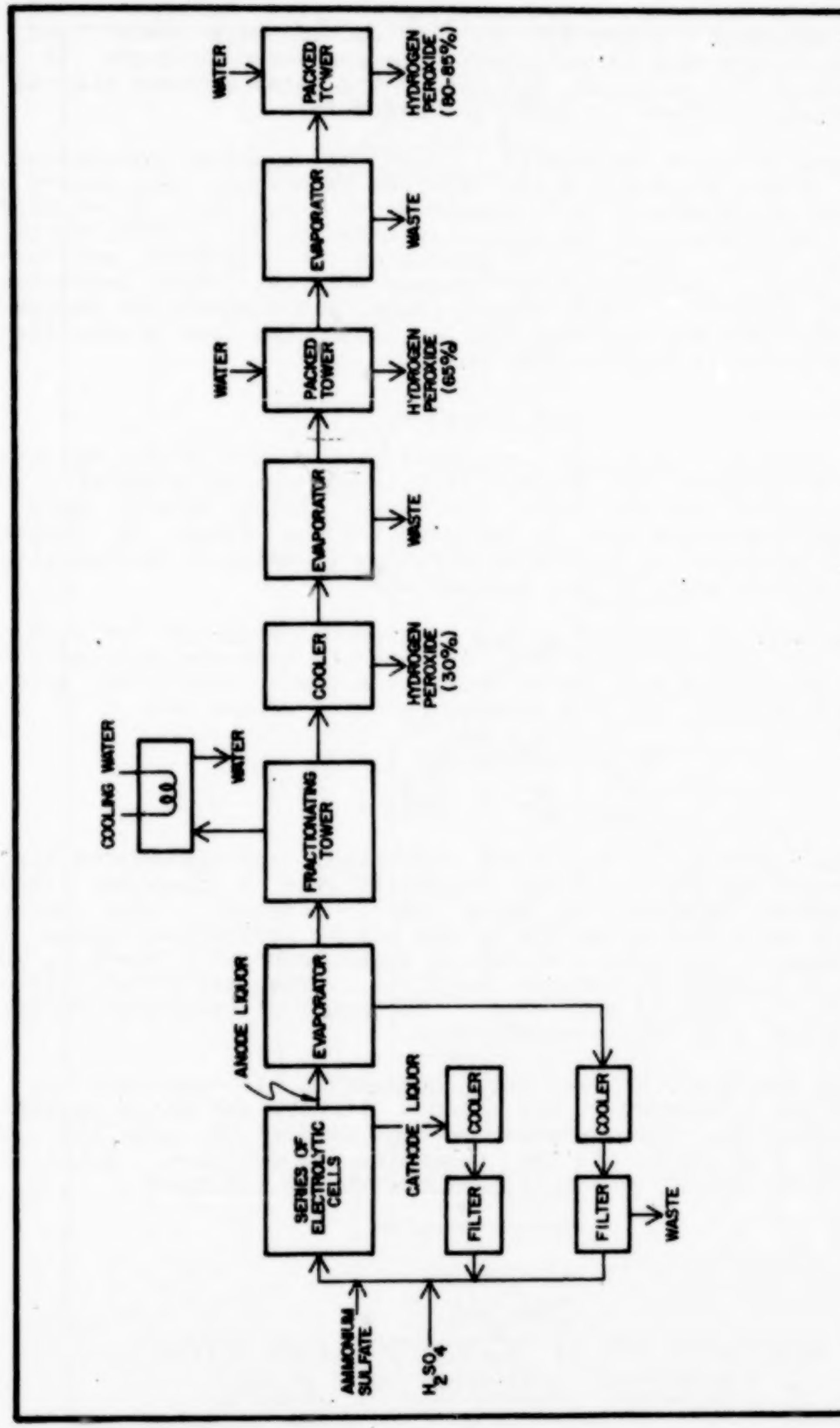

FIGURE 10
STANDARD HYDROGEN PEROXIDE ELETROLYTIC PROCESS FLOW DIAGRAM

reform the original alkylanthraquinone plus hydrogen peroxide. The hydrogen peroxide is extracted with water and the alkylanthraquinone is recycled. The recovered product is then concentrated, purified, and sold. A general process diagram for the organic process is shown in Figure 11.

Hydrogen peroxide is sold in a range of aqueous concentrations from three percent to 98 percent by weight. The higher concentration materials are dangerously reactive. A stabilizer (such as acetanilid) is typically added to the product to retard decomposition. Uses include bleaching of textiles and paper, epoxidation, production of peroxy-acid catalysts, oxidation of organic compounds, formation of foams, and a source of energy for both military and civilian applications. The U.S. production in 1971 was 57,937 kkg (63,878 tons).

Nitric Acid

This document covers production of nitric acid in concentrations up to 68 percent by weight (azectropic concentration). More concentrated nitric acid, including fuming nitric acid and nitrogen pentoxide will be included in the Phase II Document. The production of nitric acid by the reaction of sodium nitrate and sulfuric acid is also not included.

Nitric acid is produced by the catalytic oxidation of ammonia, first to nitric oxide (NO), and then to nitrogen dioxide (NO_2), which is reacted with water under pressure to form the acid as shown in Figure 12. The overall reaction scheme is:

$$4NH_3 + 5O_2 \xrightarrow{cat.} 4NO + 6H_2O$$
$$2NO + O_2 \longrightarrow 2NO_2$$
$$3NO_2 + H_2O \longrightarrow 2HNO_3 + NO$$

In the process, compressed, purified, and preheated air and anhydrous ammonia are mixed and passed over a platinum rhodium wire-gauze catalyst at about 750°C (1382°F). The resultant mixture of nitric oxide and excess air is introduced, along with additional air, into a stainless steel absorption tower in which the nitric oxide is further oxidized. The resulting nitrogen dioxide is reacted with water. The bottm of the tower yields 61 - 65 percent by weight nitric acid.

Most of the U.S. nitric acid production is utilized in the fertilizer industry. The second largest use is in explosives manufacturing. Various uses as an acidic or pickling agent account for much of the remaining production. Total U.S. production in 1971 was 6,151,112 kkg (6,742,130 tons).

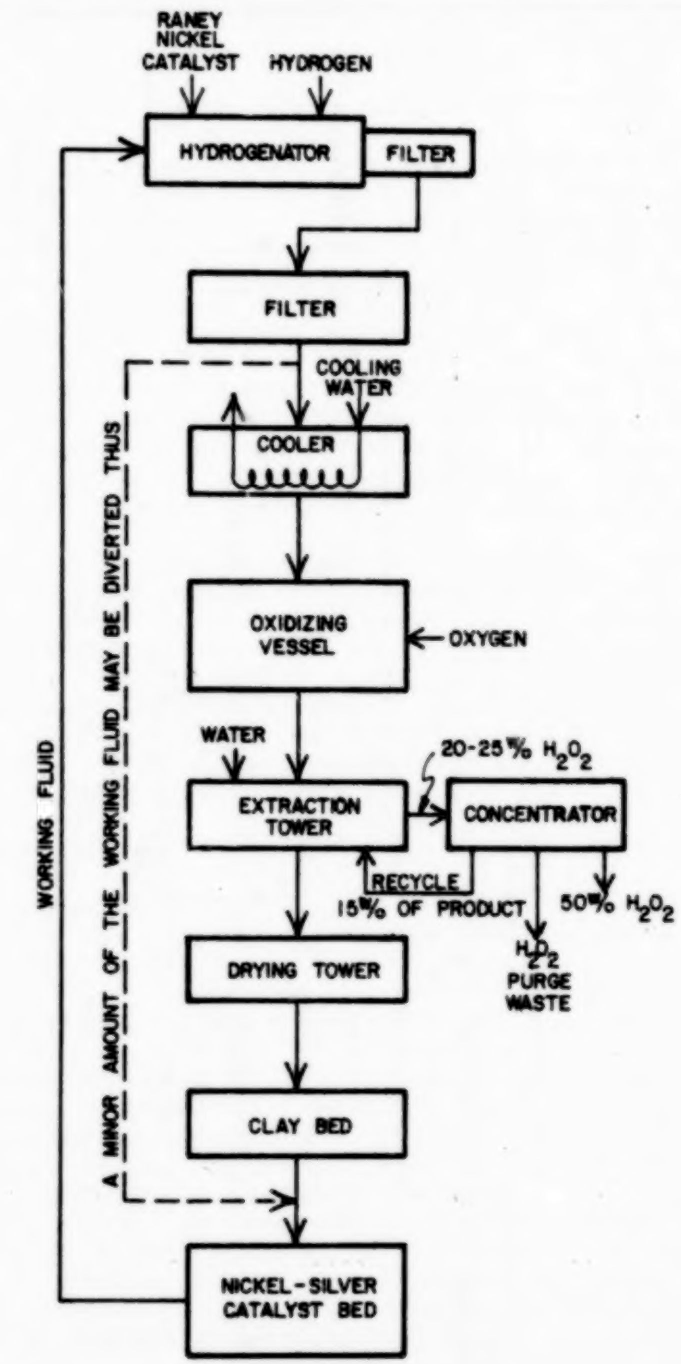

FIGURE 11
STANDARD
HYDROGEN PEROXIDE FLOW DIAGRAM
(RIEDL-PFLEIDERER PROCESS)

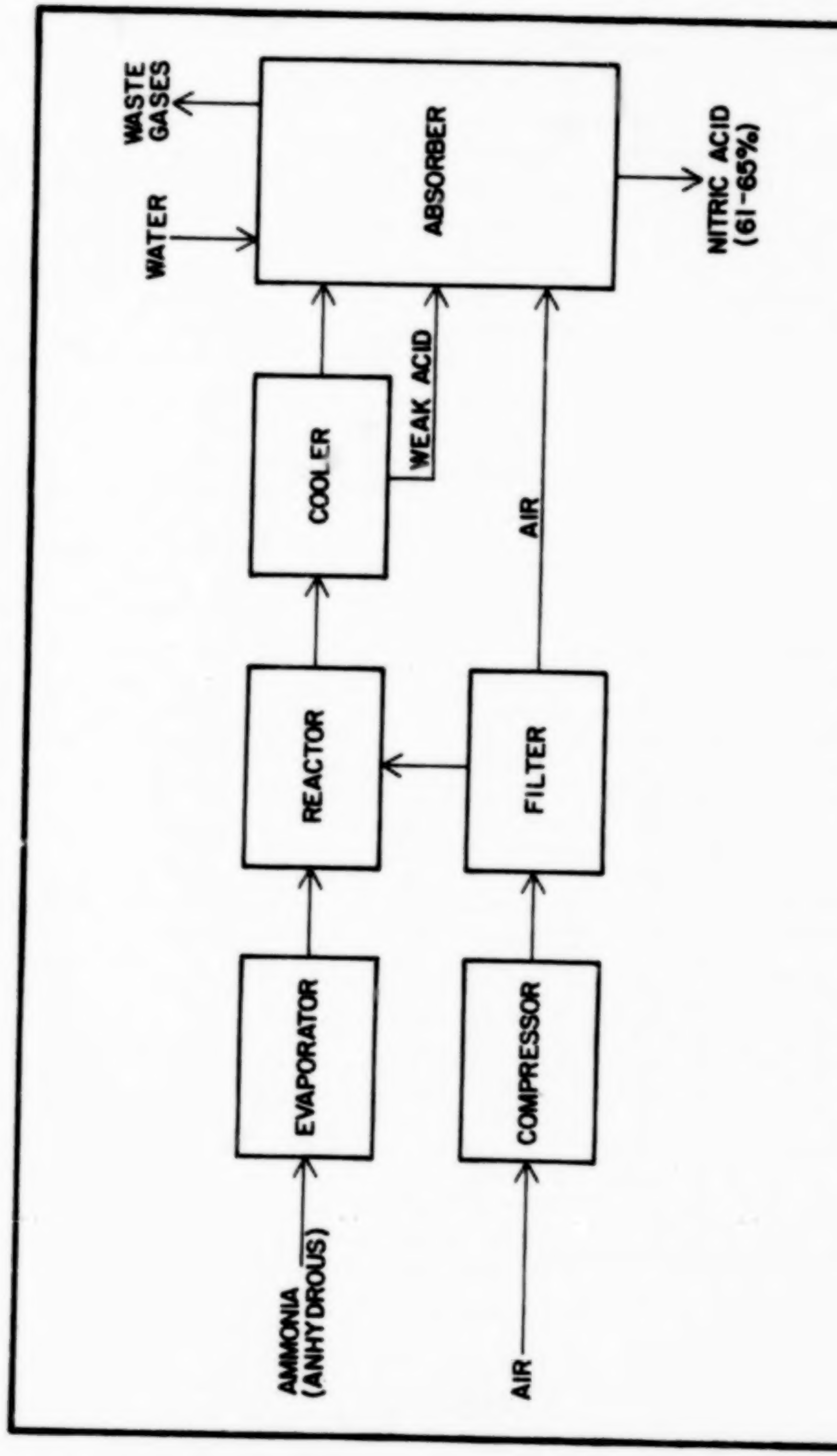

FIGURE 12
STANDARD NITRIC ACID PROCESS FLOW DIAGRAM

Potassium Metal

Potassium is produced by the reaction of potassium chloride with sodium vapor:

$$KCl + Na + Heat \rightarrow K + NaCl$$

For the commercial preparation of potassium metal, potassium chloride is melted in a gas fired melt pot and fed to an exchange column as shown in Figure 13. The molten potassium chloride flows over Raschig rings in the packed column, where it contacts ascending sodium vapors coming from a gas-fired reboiler. An equilibrium is established between the two, yielding sodium chloride and elemental potassium. The sodium chloride formed is continuously withdrawn at the base of the apparatus and is normally sold. The column operating conditions may be varied to yield either pure potassium metal as an overhead product or to vaporize sodium along with the potassium to produce sodium-potassium (NaK) alloys of varying compositions. Potassium metal of over 99.5 percent purity can be continuously produced.

Since it is relatively more reactive than sodium, the reaction between potassium and carbon (plus a tendency to form explosive carbonyls) precludes the manufacture of potassium by electrolysis. Because it is more expensive than sodium, potassium has very limited uses. Major uses include manufacture of organo-potassium compounds and production of NaK (sodium potassium alloys used in lard modification and as a nuclear reactor coolant). Total U.S. production in 1972 was about 100 kkg (110 tons), primarily from one facility.

Potassium Dichromate

Most of the potassium dichromate manufactured in the U.S. is made by reacting a sodium dichromate dihydrate solution with potassium chloride according to the following:

$$Na_2Cr_2O_7 \cdot 2H_2O + 2KCl \rightarrow K_2Cr_2O_7 + 2NaCl + 2H_2O$$

Potassium chloride is added to a dichromate solution, which is then pH adjusted, saturated, filtered and vacuum cooled to precipitate crystalline potassium dichromate which is recovered by centrifuging, dried, sized and packaged. The mother liquor from the product centrifuge is then concentrated to precipitate sodium chloride which is removed as a solid waste from a salt centrifuge. The process liquid is recycled to the initial reaction tank. Figure 14 is the standard process diagram. A relatively pure product results which requires only removal of the water prior to sizing and packaging.

The major uses of potassium dichromate are as a glass pigment and a photographic development chemical. Estimated annual production in the U.S. is 4,000-4,500 kkg (4,400-5,000 tons).

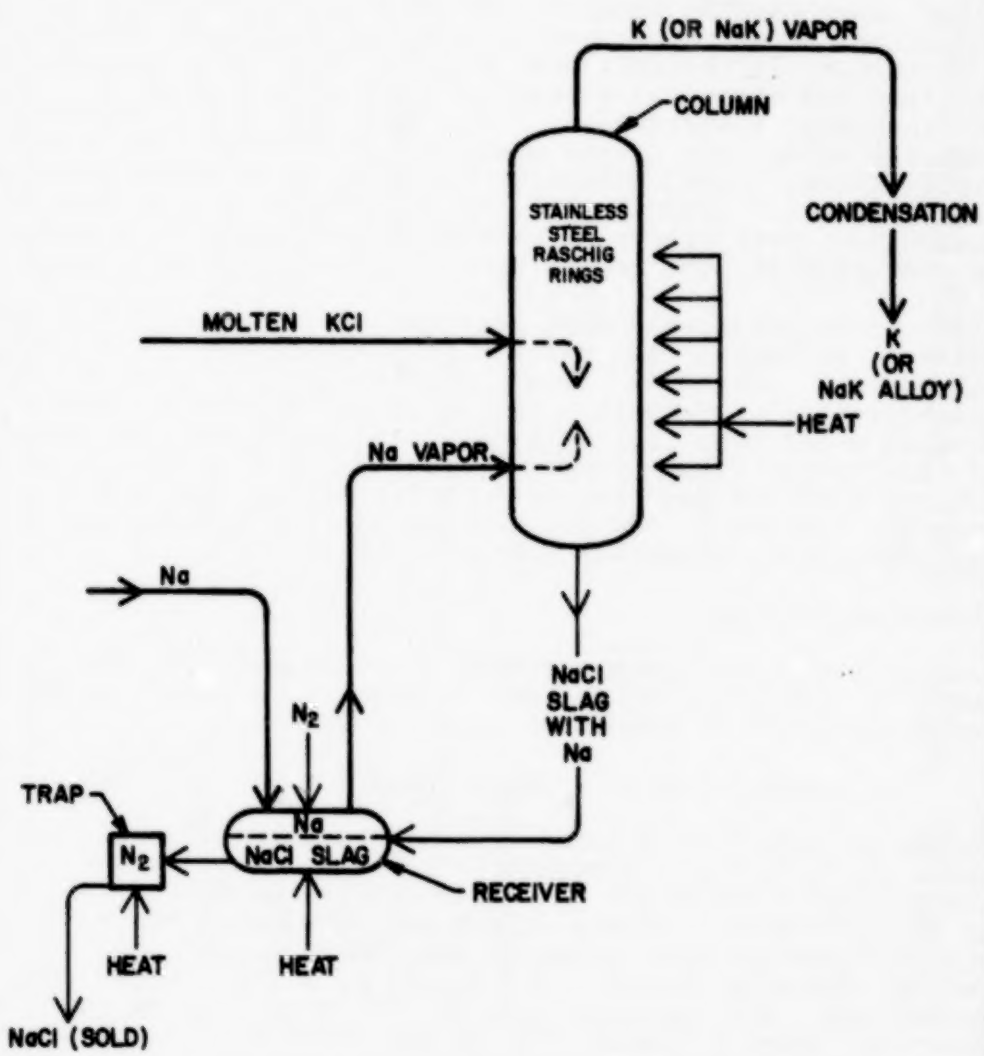

FIGURE 13
COMMERCIAL EXTRACTION OF POTASSIUM

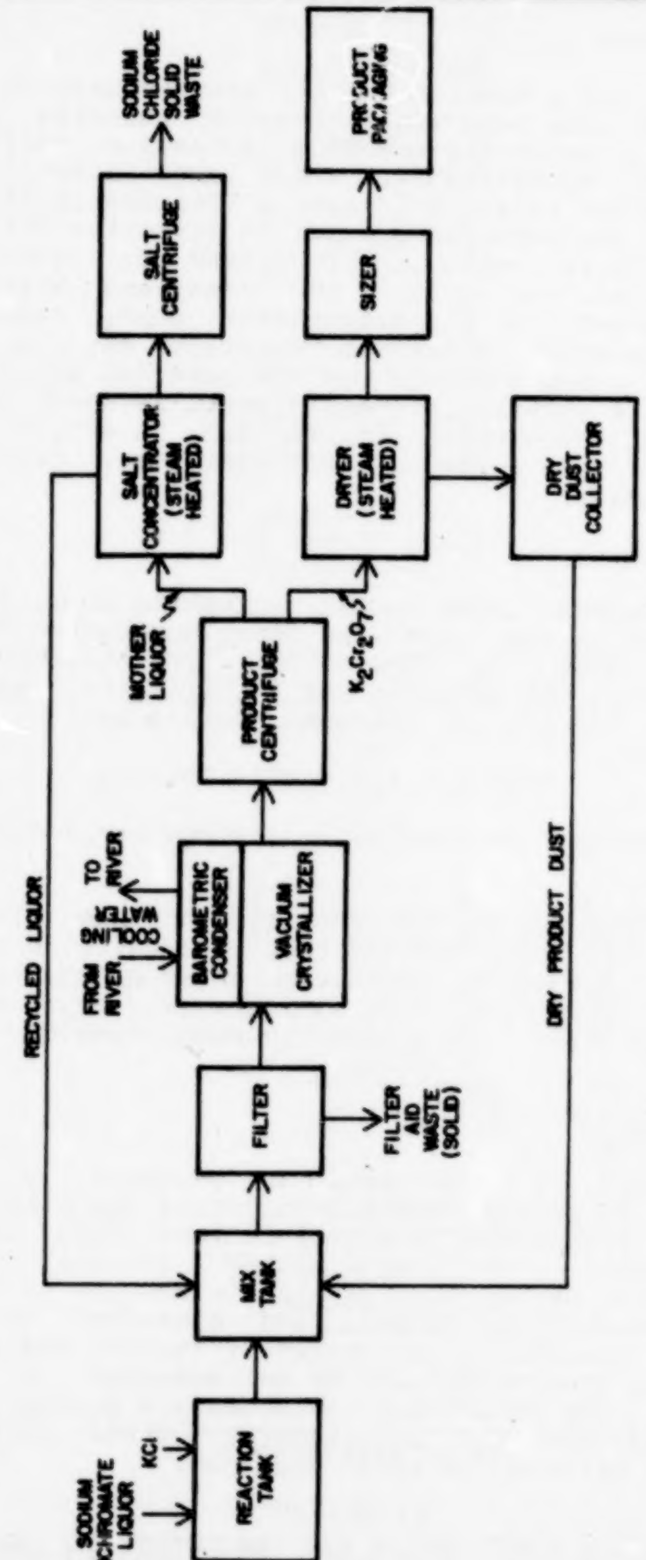

FIGURE 14
STANDARD POTASSIUM DICHROMATE PROCESS FLOW DIAGRAM

Potassium Sulfate

The bulk of the potassium sulfate manufactured in the U.S. is prepared by the treatment with potassium chloride of dissolved langbeinite, a naturally-occuring potassium sulfate-magnesium sulfate mineral, $K_2SO_4 \cdot 2MgSO_4$. Mined langbeinite is crushed and dissolved in water to which potassium chloride is added. Partial evaporation of the solution results in selective precipitation of potassium sulfate which is recovered by centrifugation or filtration, dried, and sold. The remaining brine liquor is either discharged to an evaporation pond, reused as process water, or evaporated. Magnesium chloride may be economically recovered as a byproduct if the raw material is of sufficiently high quality. A standard process diagram is shown in Figure 15. Current annual production in the U.S. is 407,916 kkg (449,742 tons). Much of this finds agricultural use, particularly for tobacco and citrus.

Sodium Bicarbonate

Sodium bicarbonate, also known as baking soda, is made by the reaction of sodium carbonate with water and carbon dioxide under pressure, as shown in Figure 16. The bicarbonate so formed precipitates from the solution and is filtered, washed, dried, and packaged. The general process reaction is:

$$Na_2CO_3 + H_2O + CO_2 \rightarrow 2NaHCO_3$$

Sodium bicarbonate is typically a minor by-product of soda ash manufacturers.

Total U.S. production in 1971 was 158,305 kkg (174,537 tons). Major industrial users include food processors, chemical plants, pharmaceutical producers, synthetic rubber manufacturers, leather processors and paper and textile producers. It is also used in fire extinguishers to form carbon dioxide and in food preparation.

Sodium Carbonate

Sodium carbonate, or soda ash, is produced by the "Solvay" process and by mining naturally-occuring deposits in California and Wyoming. Production by mining is less than that from the Solvay process. In the mining process, trona (sodium sesquicarbonate, $Na_2CO_3 \cdot NaHCO_3 \cdot 2H_2O$) is brought to the surface in solid form, crushed and ground, and dissolved in water. The solution is clarified, thickened, filtered, and sent to vacuum crystallizers, from which part of the soda ash is recovered in solid form. The remaining solution is cooled to precipitate additional soda ash and bicarbonate. These solids are then dewatered and calcined to yield soda ash.

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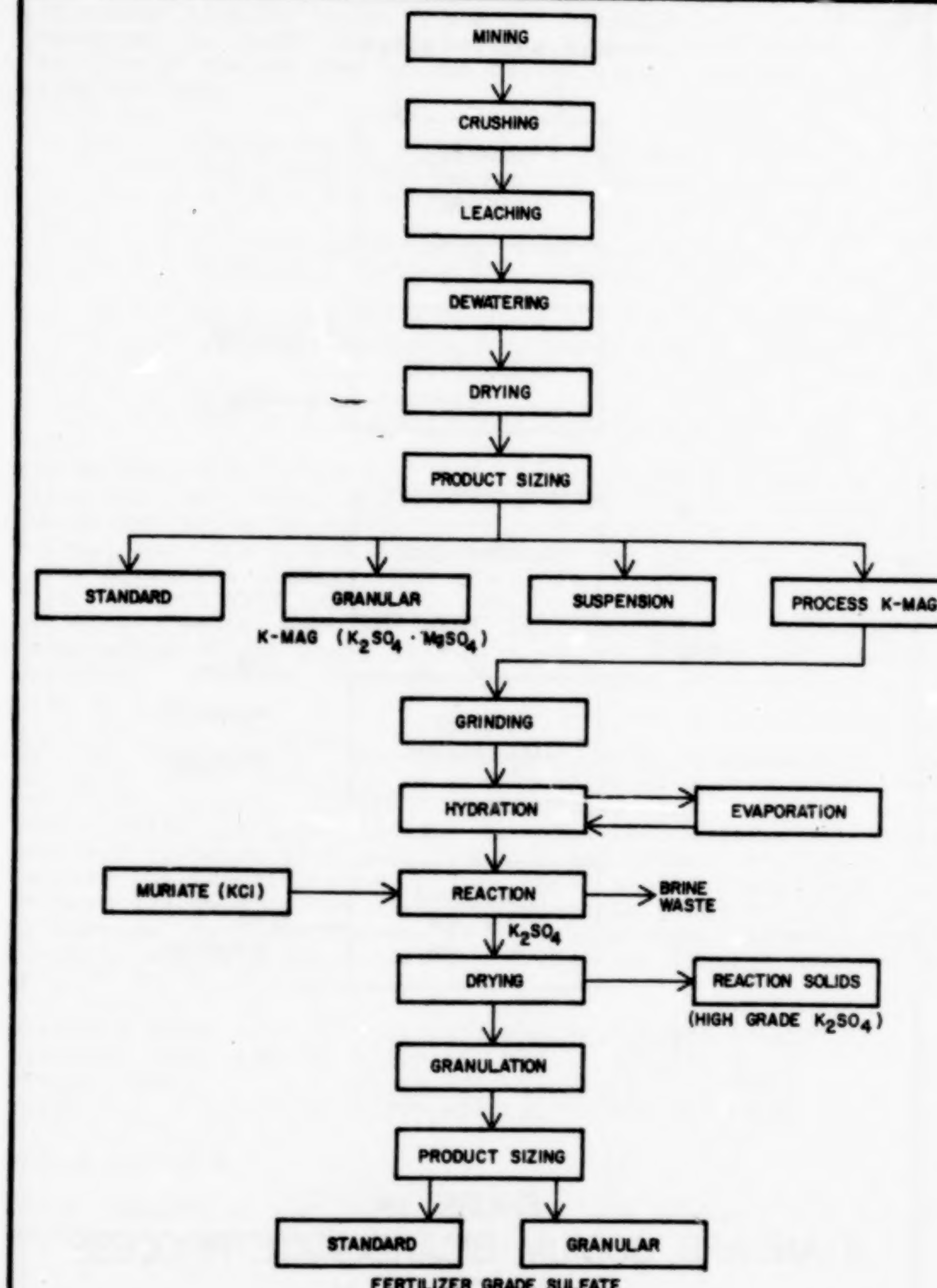

FIGURE 15
STANDARD POTASSIUM SULFATE PROCESS DIAGRAM

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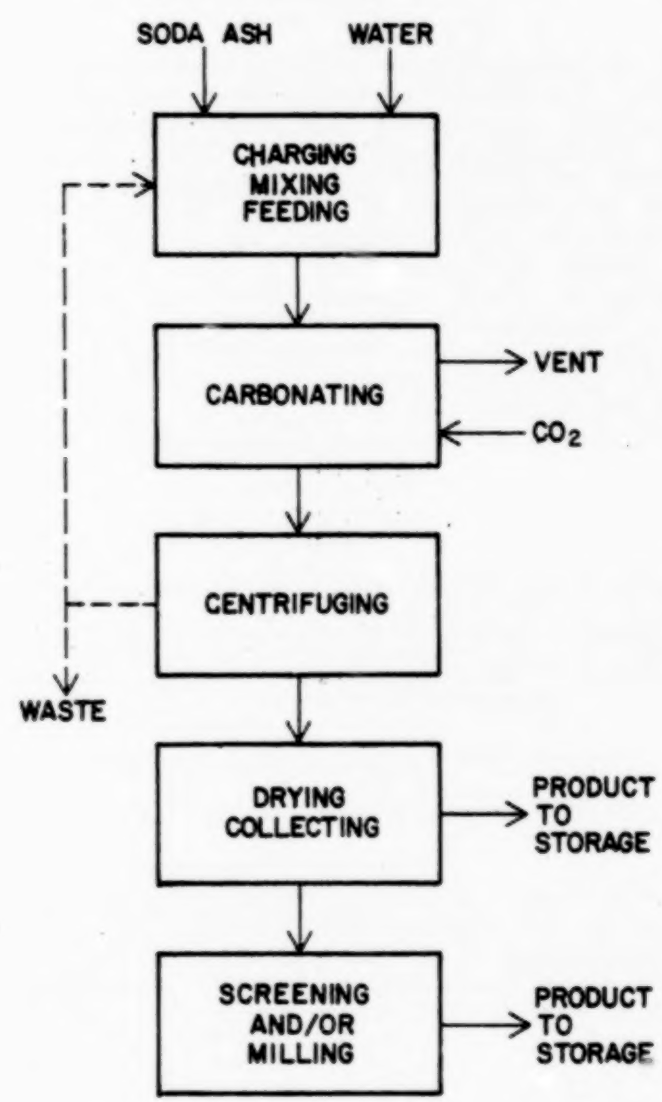

FIGURE 16
STANDARD SODIUM BICARBONATE PROCESS
FLOW DIAGRAM

The Solvay process, as shown in Figure 17, involves a reaction in aqueous solution (under pressure) between ammonia, brine (NaCl), and carbon dioxide to yield sodium bicarbonate, which is then converted to soda ash by heating. Ammonia is recovered by the addition of slaked lime to the used liquor. The general reaction is as follows:

Formation of Ammonium Bicarbonate
$NH_3 + H_2O \rightarrow NH_4OH$
$NH_4OH + CO_2 \rightarrow NH_4HCO_3$

Conversion to Sodium Bicarbonate
$NH_4HCO_3 + NaCl \rightarrow NaHCO_3 + NH_4Cl$

Conversion to Soda Ash
$2NaHCO_3 + Heat \rightarrow Na_2CO_3 + CO_2 + H_2O$

Recovery of Ammonia
$2NH_4Cl + Ca(OH)_2 \rightarrow 2NH_3 + CaCl_2 + H_2O$

The saturated brine is purified of other metal ions by precipitation, and then picks up ammonia in an absorber tower. Ammoniated brine is reacted with carbon dioxide in a carbonating tower, and the resulting bicarbonate precipitates as the sodium salt, forming a slurry. The slurry is filtered to remove the solid bicarbonate which is calcined to yield the light ash product. Dense ash is made by successive hydration and dehydration of the light ash. The carbon dioxide and ammonia are recycled. Calcium chloride is also being recovered now in some plants.

Many soda ash plants are associated with producers of glass (largest user industry) or with sources or raw material such as coke-oven plants (by-product ammonia), the cement industry (utilization of lime sludge), or solid carbon dioxide producers. Soda ash competes with caustic soda and other chemicals in a variety of applications other than glass manufacture. Large amounts are used in the non-ferrous metals industry and in the production of bicarbonate and washing soda. Several types of products are sold commercially. Production figures for the U.S. in 1971 are as follows:

Finished Light Ash	-	1,676,621 kkg	(1,848,535 tons)
Finished Dense Ash	-	2,120,467 kkg	(2,337,891 tons)
Natural Ash	-	2,598,321 kkg	(2,864,742 tons)
Total	-	6,395,409 kkg	(7,051,168 tons)

Sodium Chloride

Large quantities of this chemical are produced from brine or seawater by three basic processes:

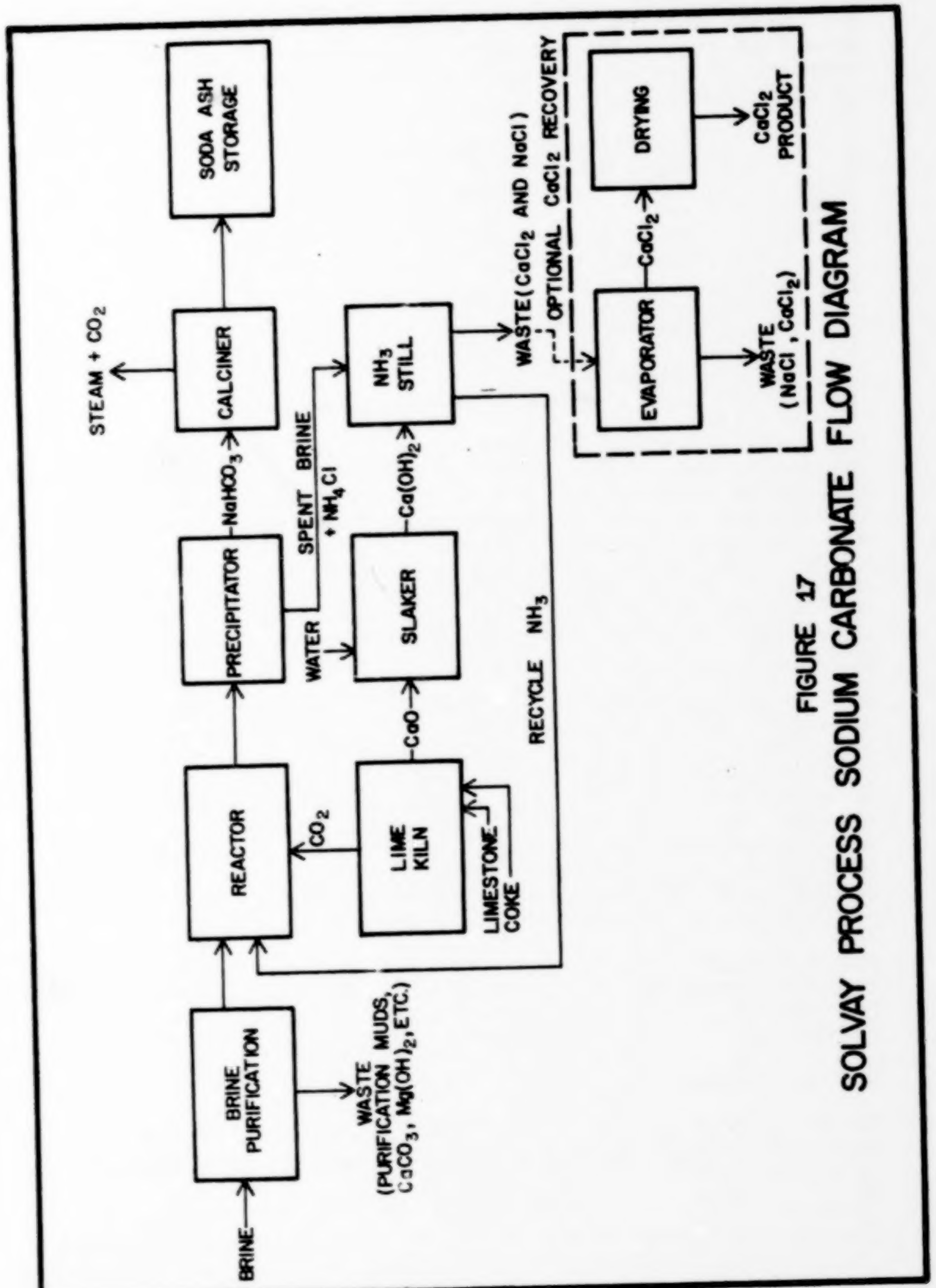

FIGURE 17
SOLVAY PROCESS SODIUM CARBONATE FLOW DIAGRAM

(1) solar evaporation of brine;
(2) solution mining of natural salt; and
(3) conventional mining of rock salt.

a) Solar evaporation process

In the solar evaporation process, salt water is concentrated by evaporation over a period of several years in open ponds to yield a saturated brine solution. After saturation is reached, the brine is then fed to a crystallizer, wherein sodium chloride precipitates, leaving behind a concentrated brine solution (bittern) consisting of sodium, potassium and magnesium salts. The precipitated sodium chloride is recovered for sale and the brine may be further evaporated to recover additional sodium chloride values and is either stored, discharged back to salt water or further worked to recover potassium and magnesium salts. A process diagram is shown in Figure 18.

b) Solution brine-mining process

Saturated brine for the production of evaporated salt is usually obtained by pumping water into an underground salt deposit and removing a saturated salt solution from an adjacent interconnected well, or from the same well by means of an annular pipe. Besides sodium chloride, the brine will normally contain some calcium sulfate, calcium chloride and magnesium chloride and lesser amounts of other materials.

The chemical treatment given to brines varies from plant to plant depending on impurities present. Typically, the brine may be first aerated to remove hydrogen sulfide and, in many cases, small amounts of chlorine are added to complete sulfide removal and oxidize all iron salts present to the ferric state. The brine is then pumped to settling tanks where it is treated with soda ash and caustic soda to remove most of the calcium, magnesium and iron present as insoluble salts. After clarification to remove these insolubles, the brine is then sent to multiple effect evaporators. As water is removed, salt crystals form and are removed as a slurry. After screening to remove lumps, the slurry is then washed with fresh brine. By this washing, fine crystals of calcium sulfate are removed from the mother liquor of the slurry and returned to the evaporator. Eventually the calcium sulfate concentration in the evaporator builds up to the point where it must be removed by "boiling out" the evaporators.

The washed slurry is filtered, the mother liquor is returned to the evaporators and the salt crystals from the filter are dried and screened. Salt produced from a typical brine will be of 99.8 percent purity or greater. Some plants do not treat the raw brine, but control the calcium and magnesium impurities by watching the concentrations in the evaporators and bleeding off

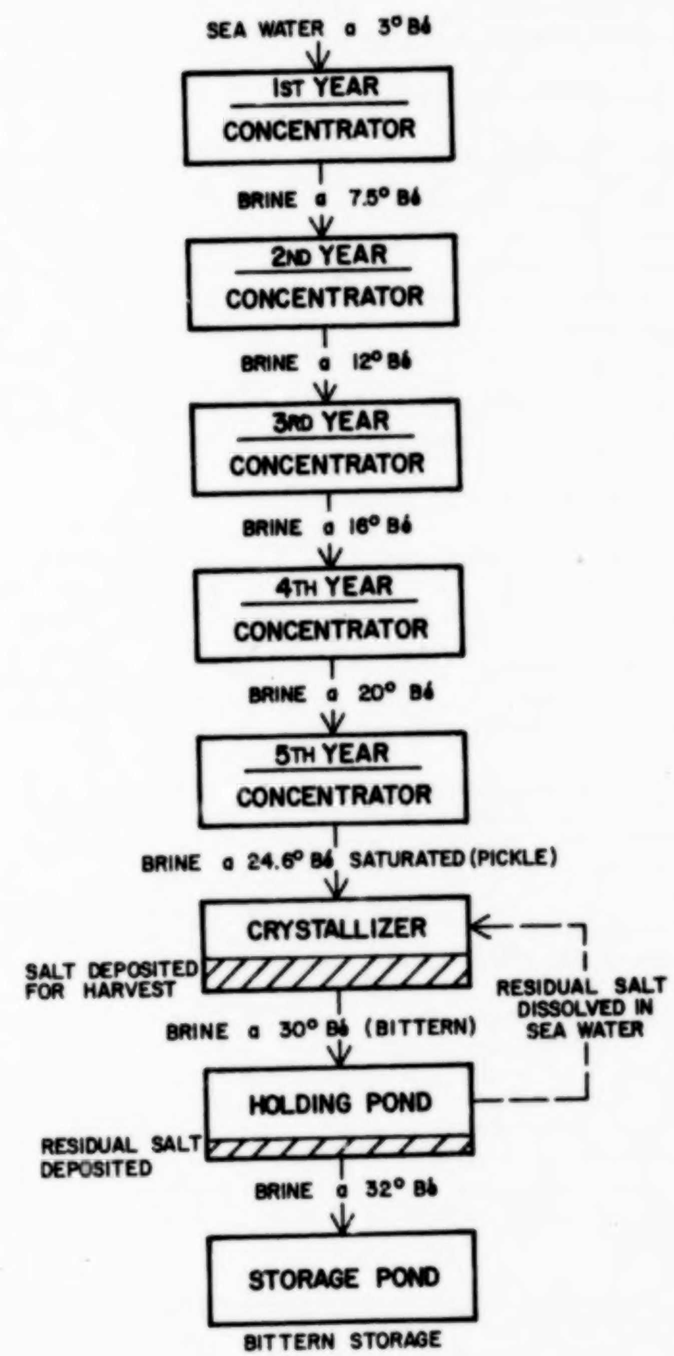

FIGURE 18
STANDARD SOLAR SALT PROCESS FLOW DIAGRAM

sufficient brine to maintain a predetermined level. By such methods, salt of better than 99.5 percent purity can be made.

In either case, the final screening of the dried salt yields various grades depending on particle size. A detailed process diagram is shown in Figure 19.

In the "Grainer" system, saturated and pretreated brine from the above processes is heated in a flat, open pan (or grainer). Flat crystals of sodium chloride form on the quiescent surface of the solution and fall to the bottom of the grainer. There they grow until they are removed by a submerged rake system. Recovered crystals are subsequently washed, dried, classified as to size, and packed. Brine pretreatment allows sodium chloride purities of 99.98 percent by this method.

In the "vacuum pan" system, pretreated brine enters vacuum evaporators which remove water and allow sodium chloride crystals to precipitate out. The crystals are then washed, filtered, and dried prior to packing. The "Alberger" process is similar except that an open evaporator is used to remove water sufficiently to allow precipitation of salt crystals. These crystals are centrifuged to remove liquid, dried, and packed. The feed to the open evaporator includes saturated brine and a slurry of sodium chloride crystals in brine. This slurry is the liquid effluent from the evaporator with some of the water removed by evaporation.

A wide variety of solid products are available, with various particle sizes, solid forms, purities, and additives. Exact production figures are not available, but current annual production appears to be between 40,000,000 and 50,000,000 kkg (44,000,000 and 55,000,000 tons). Because salt sources are widespread and the product is relatively inexpensive, production facilities are localized and operated on a relatively low profit margin. Major salt deposits in the U.S. include a large bed extending from western New York through much of Michigan, brine wells in the Ohio Valley, a large bed under central Kansas and northern Oklahoma, and salt domes in Texas and Louisiana. In 1971 salt production by solar evaporation was 2,140,000 kkg (2,350,000 tons) and the production by solution mining was 5,390,000 kkg (5,928,000 tons). Practically all chemical compounds containing sodium or chlorine are derived from salt. The chemical industry utilizes almost all of the brine produced and over half of the rock salt production. About three percent of the production is used as table salt, although more than this is utilized in the food processing industry.

Sodium Dichromate and Sodium Sulfate

Sodium dichromate ($Na_2Cr_2O_7$) is prepared by the calcination of a mixture of chrome ore (typically chromite, $FeO.Cr_2O_3$), sodium

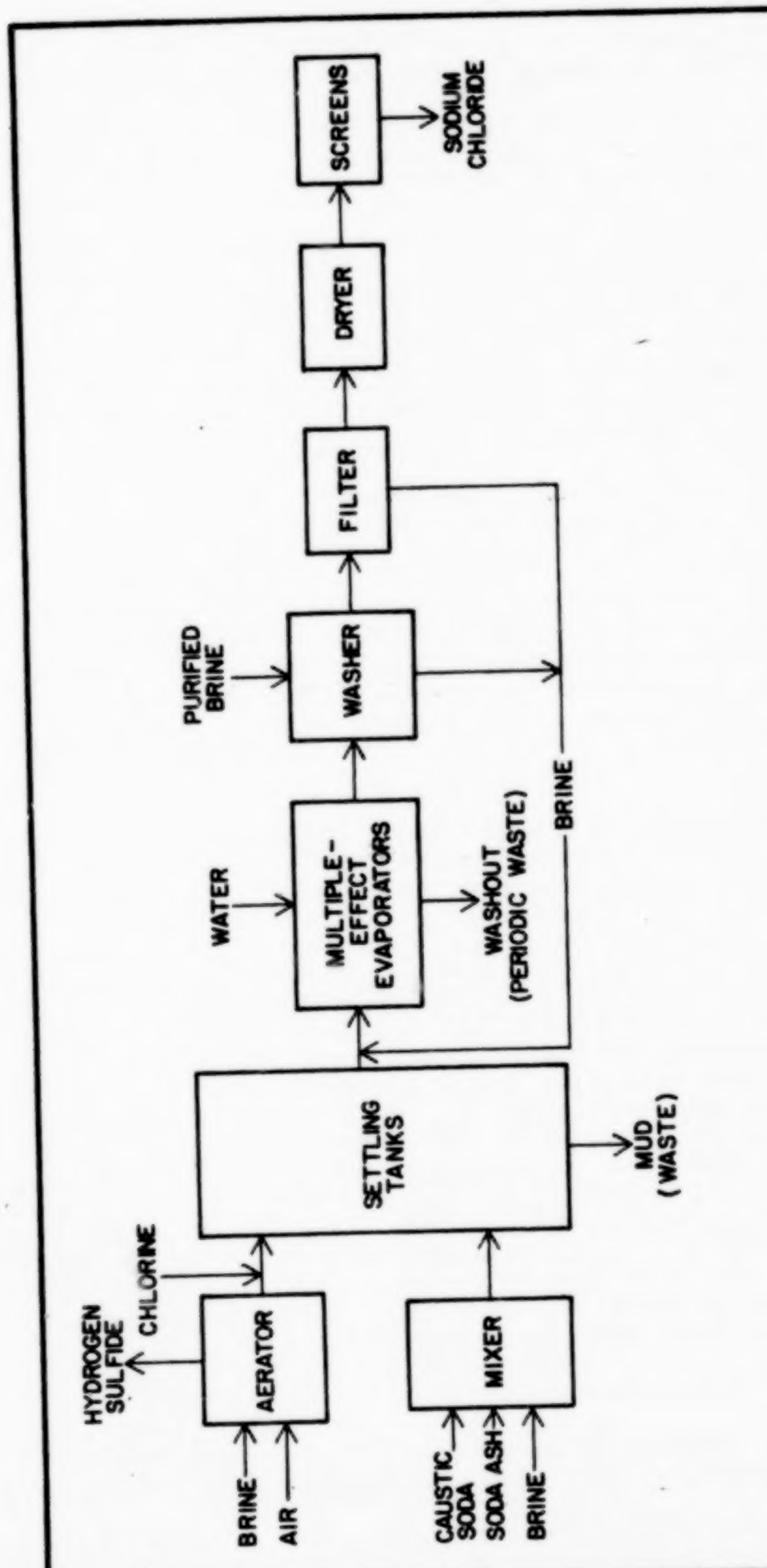

FIGURE 19
STANDARD MULTIPLE-EFFECT EVAPORATION SODIUM CHLORIDE PROCESS FLOW DIAGRAM

carbonate, and lime. This is followed by a water leach and conversion of the soluble chromates to dichromate with sulfuric acid, as shown in Figure 20. The overall reaction scheme is:

Formation of Chromate

$$4(FeO.Cr_2O_3) + 8Na_2CO_3 + 7O_2 \rightarrow 8Na_2CrO_4 + 2Fe_2O_3 + 8CO_2$$

Conversion to Dichromate

$$2Na_2CrO_4 + H_2SO_4 \rightarrow Na_2Cr_2O_7 + H_2O + Na_2SO_4$$

After the leaching operation, calcium salts are precipitated by pH adjustment and then removed along with the iron oxide. The leachate containing the soluble chromate is then acidified by addition of sulfuric acid, thereby forming the dichromate and sodium sulfate. The sulfate is removed and the dichromate solution is partially evaporated and removed to a crystallizer where sodium dichromate crystals are allowed to form. The crystals are centrifuged to remove excess water and then dried and packed for shipment.

Other chromate products are often made in the same plant, including production of "chromic acid" (sold as the liquid solution of CrO_3) by treatment of sodium dichromate with sulfuric acid, and sodium chromate, produced either by the chromite ore reaction above (crude chromate) or by reaction of sodium dichromate with soda ash (very pure product). Sodium dichromate is the major product of the industry. It is sold as an orange-colored dihydrate ($Na_2Cr_2O_7 \cdot 2H_2O$). Current production is estimated to be between 100,000 and 150,000 kkg (110,000 and 165,000 tons). The major demand for this chemical is in the manufacturing of pigments. Other uses include leather tanning, metal treatment, and corrosion inhibition.

Sodium sulfate (salt cake) is produced as a by-product from sodium dichromate manufacture, by direct mining and natural brine recovery operations, and as a by-product of organic syntheses. Most of the U.S. production arises from production of rayon and various organic chemicals and is not covered in this Document. Production from mining and natural brines is also not considered herein.

In sodium dichromate manufacture, soda ash, lime, and chrome ore are reacted as shown above. The products are then leached with sulfuric acid to convert the chromate to dichromate. The leachate, containing sodium sulfate in addition to sodium dichromate, is partially evaporated to the point where the sulfate is precipitated. The solid sulfate is filtered out, dried, and sold.

Since sodium sulfate is primarily a by-product material, the supply often exceeds the demand. In addition, the natural product is relatively abundant and limited in competition only by

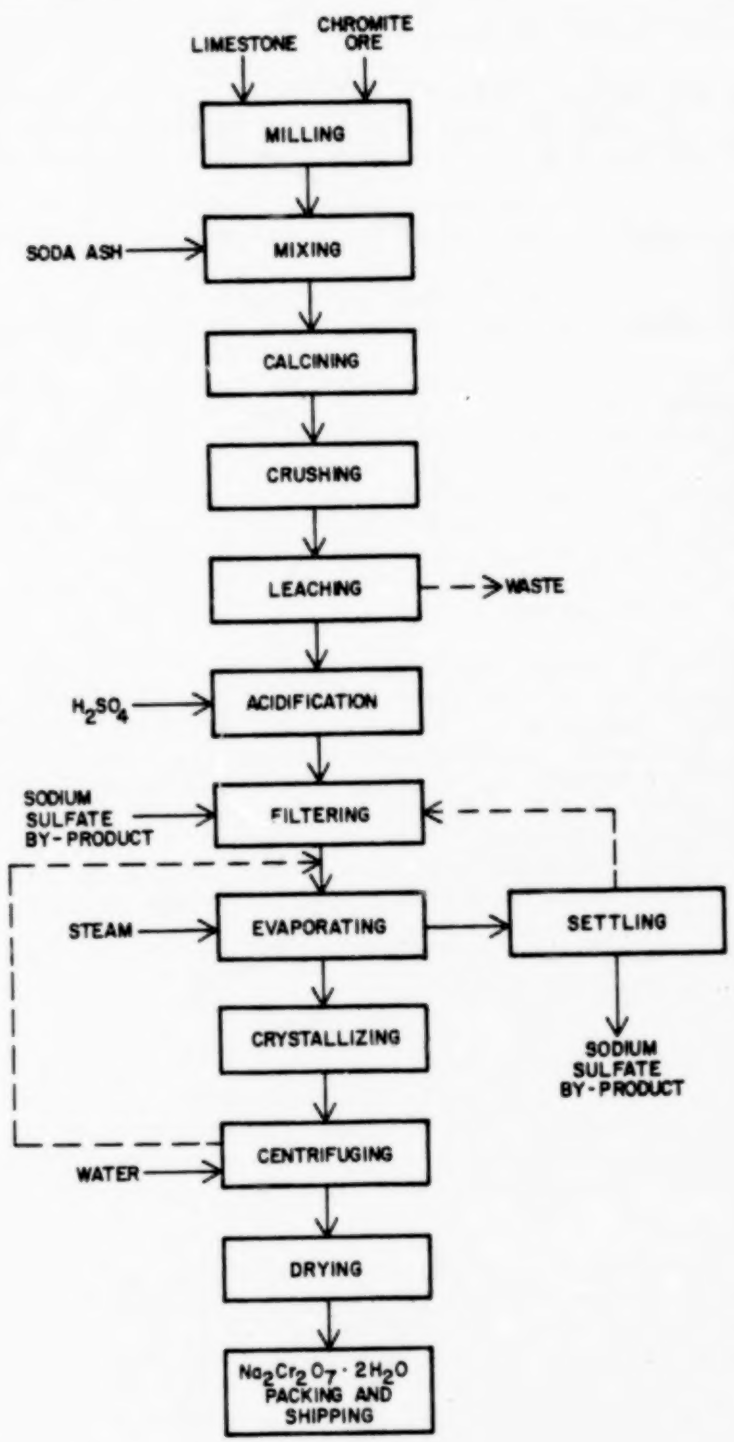

FIGURE 20
STANDARD SODIUM DICHROMATE PROCESS DIAGRAM

distance from the markets. The largest use is in the kraft pulp and paper industry. Another major use is as a "builder" in detergents. Total U.S. production in 1971 was 764,409 kkg (842,788 tons) of high purity sodium sulfate and 465,785 kkg (513,545 tons) of Glauber's salt ($Na_2SO_4 \cdot 10H_2O$). The dichromate by-product is sometimes called "chrome cake". Present annual production of this form of sodium sulfate is estimated to be 110,000 kkg (121,000 tons).

Sodium Metal

Sodium metal is manufactured by electrolysis of fused (molten) sodium chloride at about 600°C (1072°F), as shown in Figure 21. The general equation is:

$$2NaCl + \text{direct current} \rightarrow 2Na + Cl_2$$

After purification to remove magnesium salts and sulfates, the sodium chloride is mixed with alkali fluorides and calcium chloride to lower the melting point. The charge is then fused in a "Downs" cell, which is a closed rectangular refractory-lined steel box with separate anode and cathode compartments separated by an inorganic diaphragm. The graphite or carbon anode is fed into the bottom of the cell, and the cathode is iron or copper in an annular form.

Molten sodium formed at the cathode is transported to a collection vessel. The metal is withdrawn from the bottom, filtered, and packaged in the form of bricks of various sizes. Very pure metal results from blanketing the cell and other processing equipment with argon gas to prevent oxygen from entering the system. Even the less pure product, because of its reactivity, must be protected from air and water throughout the production process. By-product chlorine is liberated in the cell, dried with sulfuric acid and the purified product is compressed and sold.

The U.S. production of sodium metal in 1971 was 138,839 kkg (153,075 tons). One of its major uses is in the manufacturing of tetraethyl lead and other organometallic compounds. Other uses include production of sodium cyanide, sodium peroxide, titanium, and zirconium. It is also used in liquid form as a nuclear reactor coolant and as a light, thermally-conductive solid in various applications.

Sodium Silicate

Several forms of sodium silicate are manufactured including both liquid and anhydrous (solid or powder) forms of sodium metasilicate (Na_2SiO_3), sodium orthosilicate (Na_4SiO_4), and sodium tetrasilicate ($Na_2Si_4O_9$). The liquid forms are generally sold in 20 - 50 percent by weight aqueous solutions called "water

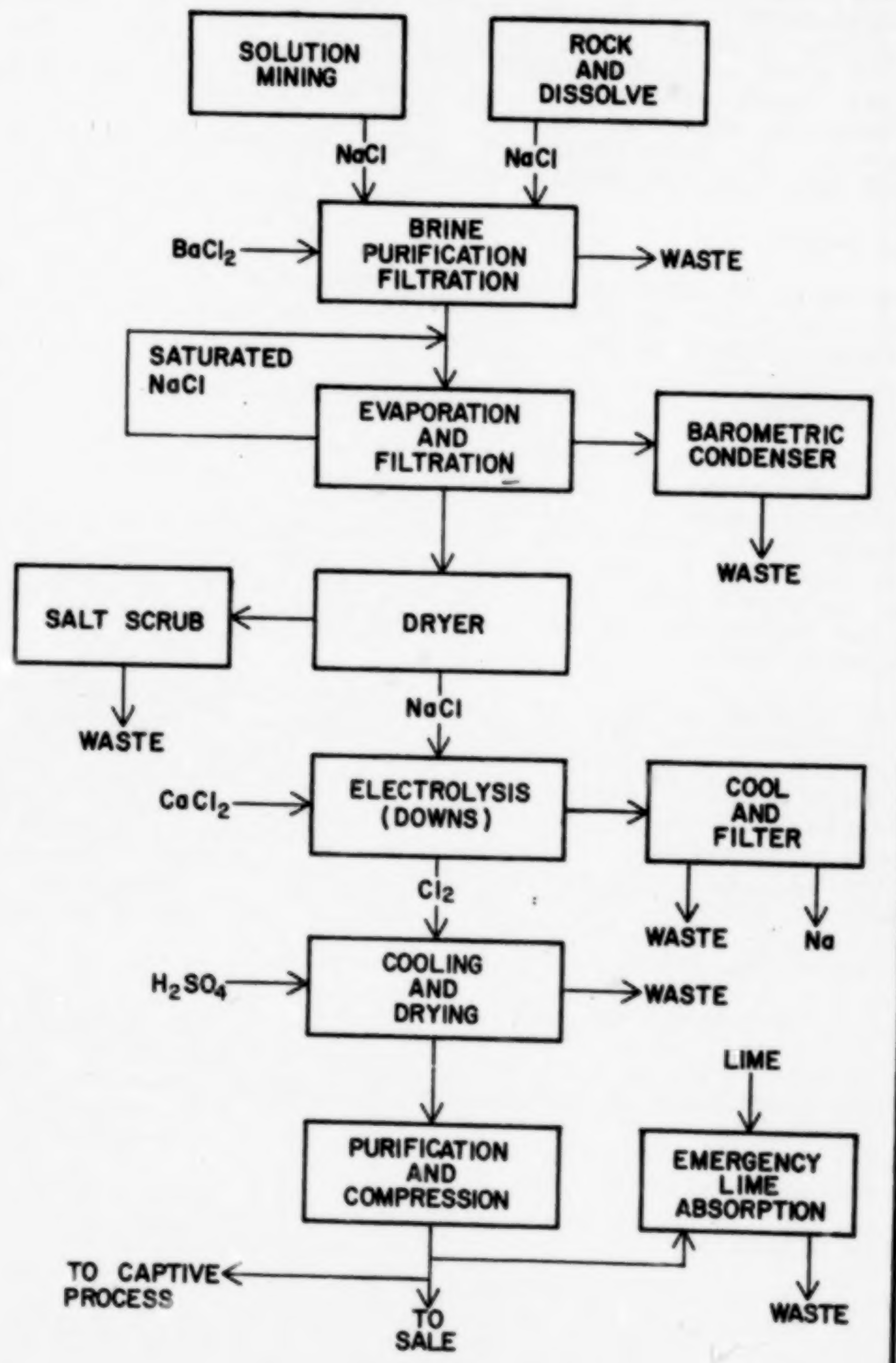

FIGURE 21
STANDARD CHLORINE-SODIUM DOWNS CELL PROCESS FLOW DIAGRAM

glass", because they solidify to a glass which is water-soluble. The general production process as shown in Figures 22 and 23, involves reaction of caustic soda (NaOH) and silica (SiO_2). The relative proportions of the reactants determine the product composition. Equations for the several reactions are:

Sodium Metasilicate
$4NaOH + 2SiO_2 + Heat \rightarrow 2Na_2SiO_3 + 2H_2O$

Sodium Orthosilicate
$4NaOH + SiO_2 + Heat \rightarrow Na_4SiO_4 + 2H_2O$

Sodium Tetrasilicate
$2NaOH + 4SiO_2 + Heat \rightarrow Na_2Si_4O_9 + H_2O$

Sodium silicates, other than those listed above, can be produced by further variation of the caustic-silica reactant ratios.

In a typical process, caustic soda and silica sand are mixed in the desired proportion and charged to a furnace. Water and steam are added to the product under pressure to completely dissolve the silicate. The liquid product is then stored or used to produce silicate in solid form. The production of solid silicate from silicate solution essentially involves evaporation of the water, although the silicate in solution may be further reacted with a caustic solution during the process if a higher sodium crude content is desired in the solid product. This is typically the case in the production of sodium metasilicate (anhydrous) from tetrasilicate water glass. The dried anhydrous silicate is screened and milled to achieve the desired particle sizes.

Silicate plants are often captive to soap or catalyst manufacturers or other users. One of the major uses is in the manufacture of silica gel. In 1971, the U.S. production of sodium silicate in water glass form was 569,701 kkg (628,116 tons), and that of anhydrous sodium metasilicate was 244,808 kkg (269,910 tons).

Sodium Sulfite

The major process for sodium sulfite manufacture consists essentially of reacting sulfur dioxide with soda ash (Na_2CO_3). Another source is as a by-product from the production of phenol through the reaction of sodium benzene sulfonate with sodium hydroxide. The latter is not considered in this Document.

In the soda ash-sulfur dioxide reaction process, shown in Figure 24, the sulfur dioxide gas is passed into a solution of sodium carbonate until the product is acidic. At this point the solute consists primarily of sodium bisulfite ($NaHSO_3$), which is converted to sodium sulfite (Na_2SO_3) by the further addition of

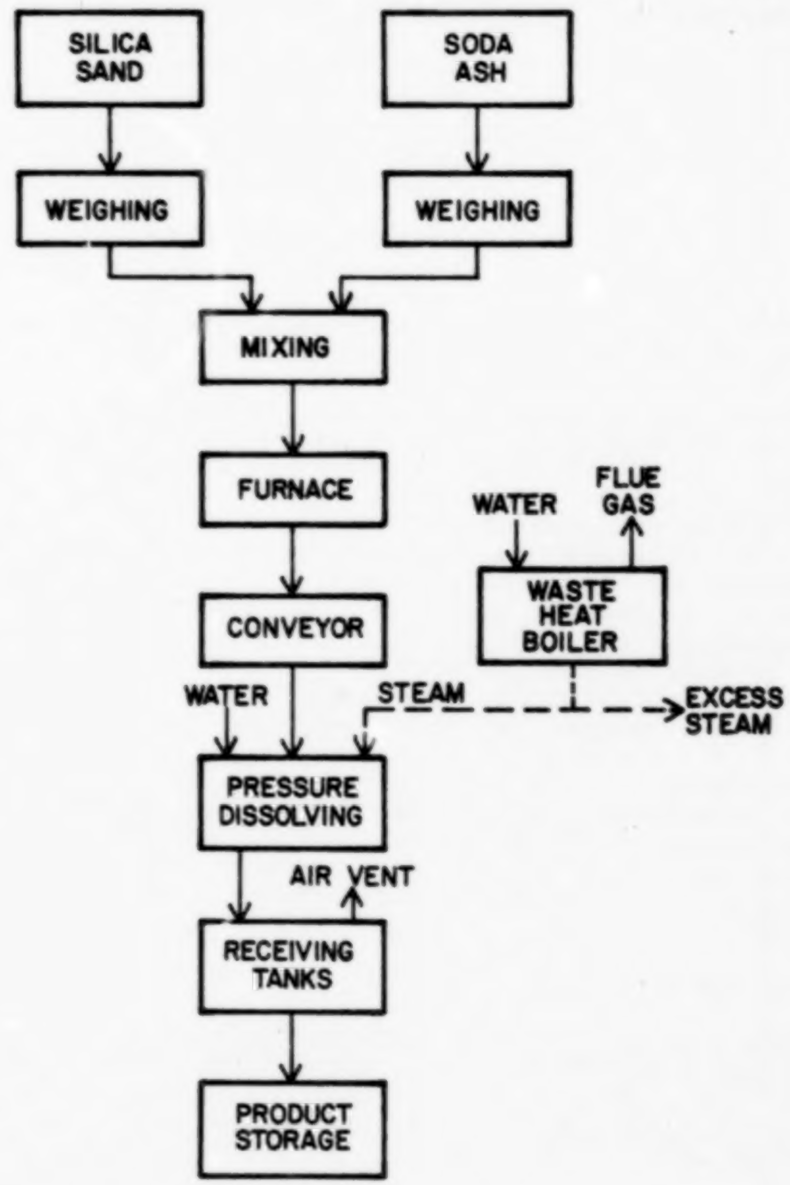

FIGURE 22
STANDARD LIQUID SODIUM SILICATE
FLOW DIAGRAM

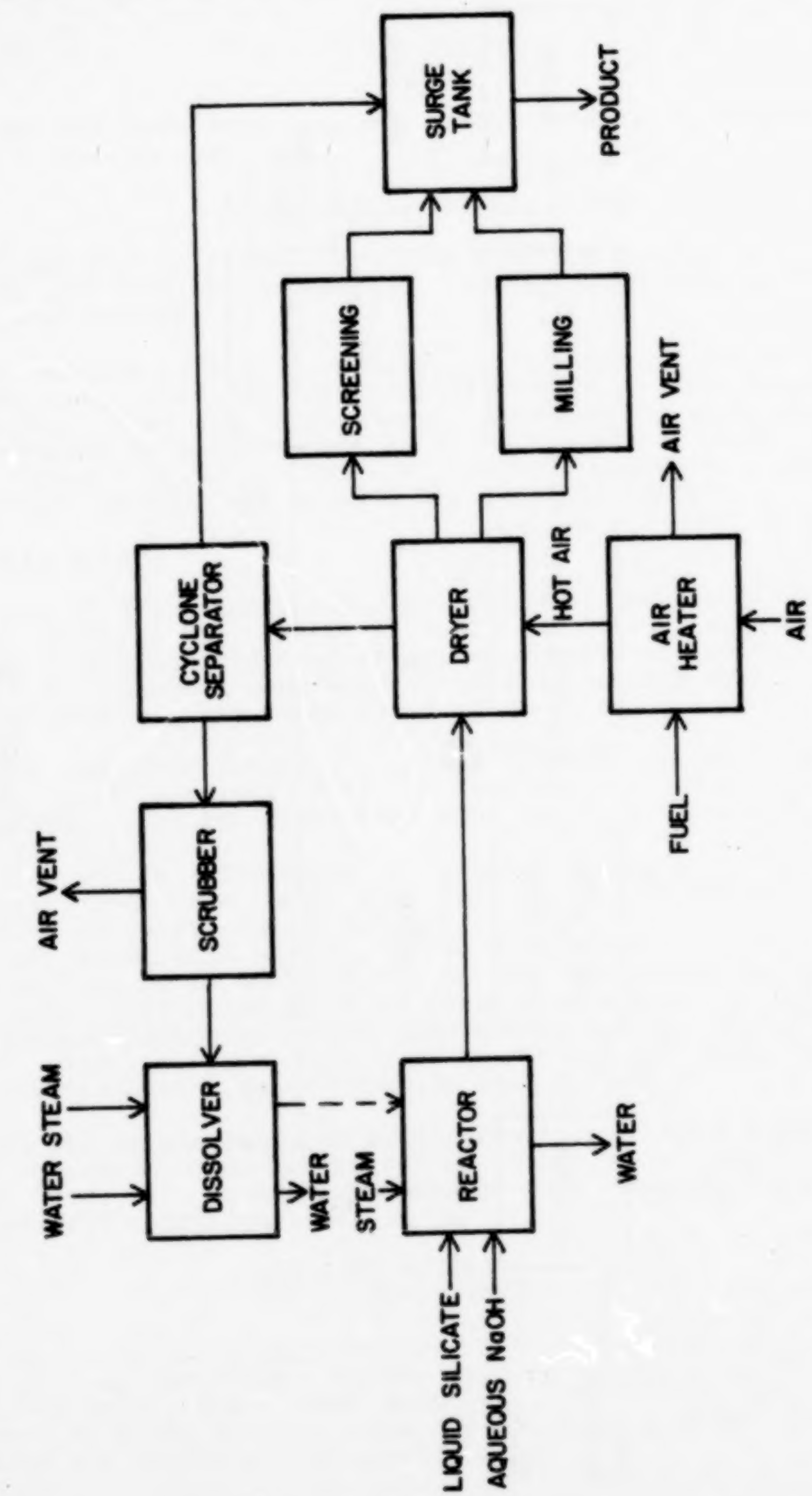

FIGURE 23
STANDARD ANHYDROUS SODIUM METASILICATE
FLOW DIAGRAM

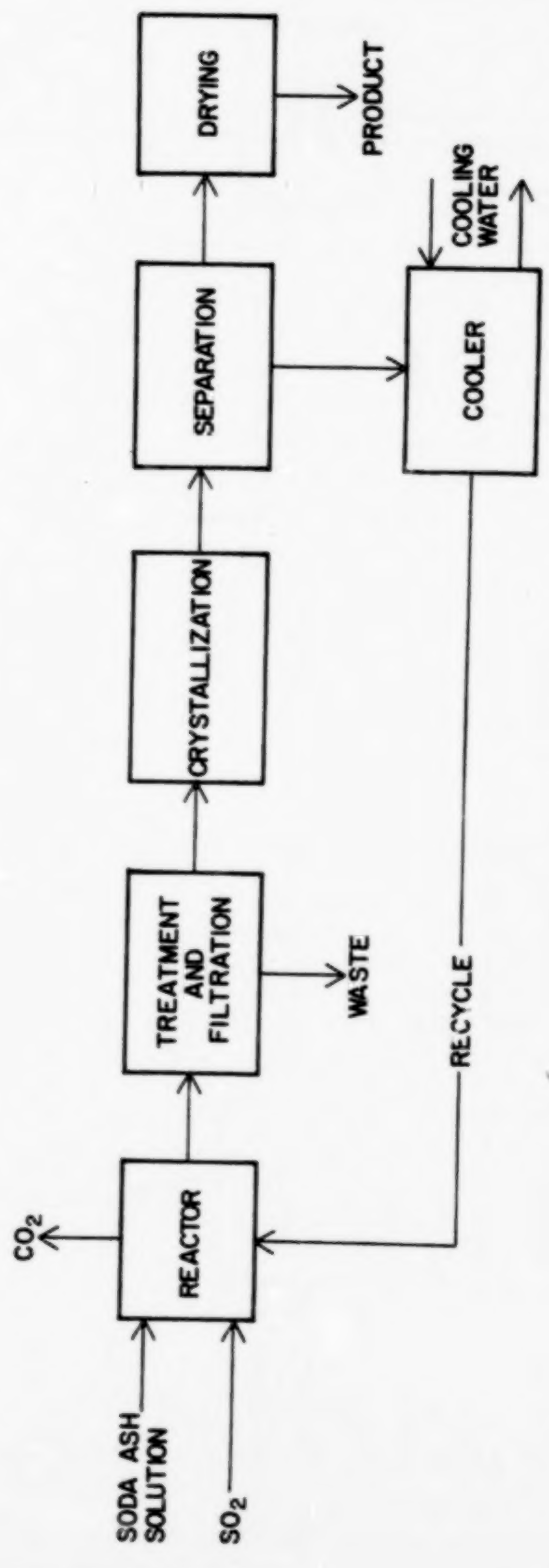

FIGURE 24
STANDARD SODIUM SULFITE PROCESS FLOW DIAGRAM

soda ash and heat until all the carbon dioxide is released. The overall reaction is:

$$SO_2 + Na_2CO_3 \rightarrow Na_2SO_3 + CO_2$$

The crude sulfate formed from this reaction is purified, filtered to remove insolubles from the purification steps, crystallized, dried and shipped.

Sodium sulfite is a mild reducing agent, and is widely used as an antioxidant. Specific uses include bleaching and stabilization of yarns, textiles and paper, preservation of foodstuffs and photographic developers, and as a boiler feed water additive. The paper industry is the largest consumer. Total U.S. production in 1971 was 185,393 kkg (204,402 tons).

Sulfuric Acid

Sulfuric acid is manufactured primarily by the contact process, which involves the burning of sulfur to sulfur dioxide, followed by the catalytic oxidation of sulfur dioxide to sulfur trioxide which is reacted with water to yield sulfuric acid. Using the contact process, are three types of plants:

(a) double absorption - paired sulfur trioxide absorption towers and catalyst beds in series are used to maximize conversion of sulfur dioxide so that tail gas scrubbers are not required;

(b) single absorption - single absorption towers and catalyst beds are used and tail gases frequently have to be scrubbed to remove sulfur oxides;

(c) spent acid plants - these plants use spent sulfuric acid in place of, or in addition to, sulfur as a raw material. While the acid production parts of these plants are the same as those for single absorption, these plants are unique because of the spent acid pyrolysis units used to convert the waste sulfur acid raw materials to a sulfur dioxide feed stream.

Almost all of the sulfuric acid production in this country arises from catalytic oxidation of sulfur dioxide to sulfur trioxide (SO_3) and its subsequent reaction with water to form the acid. The general reactions are:

$$2SO_2 + O_2 \rightarrow 2SO_3$$
$$SO_3 + H_2O \rightarrow H_2SO_4$$

The source of the sulfur dioxide for acid manufacturing varies widely; raw materials include sulfur, refinery sludges, pyrites (sulfide ores), spent acid solutions, recovered SO_2, and by-product hydrogen sulfide. The sulfur, iron sulfide, and hydrogen sulfide are burned in air according to:

$$S + O_2 \rightarrow SO_2$$
$$4FeS_2 + 11O_2 \rightarrow 8SO_2 + 2Fe_2O_3$$
$$2H_2S + 3O_2 \rightarrow 2SO_2 + 2H_2O$$

Sulfur dioxide from oxidation of iron sulfide or from roasting of other sulfide ores is relatively impure and requires removal of materials such as dust, moisture, arsenic, chlorine, and fluorine, all of which would poison the catalyst used in the contact process. Most of the U.S. production of sulfuric acid arises from the use of sulfur or refining sludge raw materials.

In the contact process, purified and dry sulfur dioxide is mixed with air, heated, and introduced into a reactor (converter) containing a platinum or vanadium pentoxide catalyst. The resulting gas mixture is cooled and sent to a succession of internally-cooled towers where the sulfur trioxide is absorbed by oleum (acid plus excess sulfur trioxide) of successively decreasing sulfur trioxide concentrations. Acid less than 97 percent concentration cannot be used to absorb sulfur trioxide because of mist formation and resulting sulfur trioxide losses. Various products are sold, ranging in acidic strength from battery acid (33.5 percent H_2SO_4, 50°Be) to 70 percent oleum (70 percent free SO_3 in H_2SO_4). Iron or steel containers can be used for the higher acid concentrations. Dilute acid requires specialized containers lined with glass, rubber, or lead.

In the double absorption contact process, sulfur is burned to yield dioxide which is then passed through a catalytic converter with air to produce sulfur trioxide. The sulfur trioxide is then absorbed in 95-97% sulfuric acid. The gases emerging from the absorber are then fed to a second converter to oxidize the remaining sulfur dioxide to sulfur trioxide which is then absorbed in a second absorption tower. The tail gases are vented to the atmosphere.

As in other versions of the contact process, 95-97 percent stream sulfuric acid is used in the absorption towers. Pickup of sulfur trioxide in this medium converts it to 98 percent acid. Some of this acid is drawn off for sale and the remainder is diluted back to 96-97 percent stream and recirculated through the absorption towers. A process flow diagram is given in Figure 25.

The single absorption process differs from that previously described only in the arrangement of the converters and absorbers. For the single absorption process, the sulfur dioxide is passed through one or more converters and then into one or more absorbers prior to venting to the atmosphere as shown in Figure 26. This arrangement is less effective for both conversion of sulfur dioxide to sulfur trioxide and for absorption of the sulfur trioxide into the absorber sulfuric acid. As a result, the tail gases may be scrubbed and this

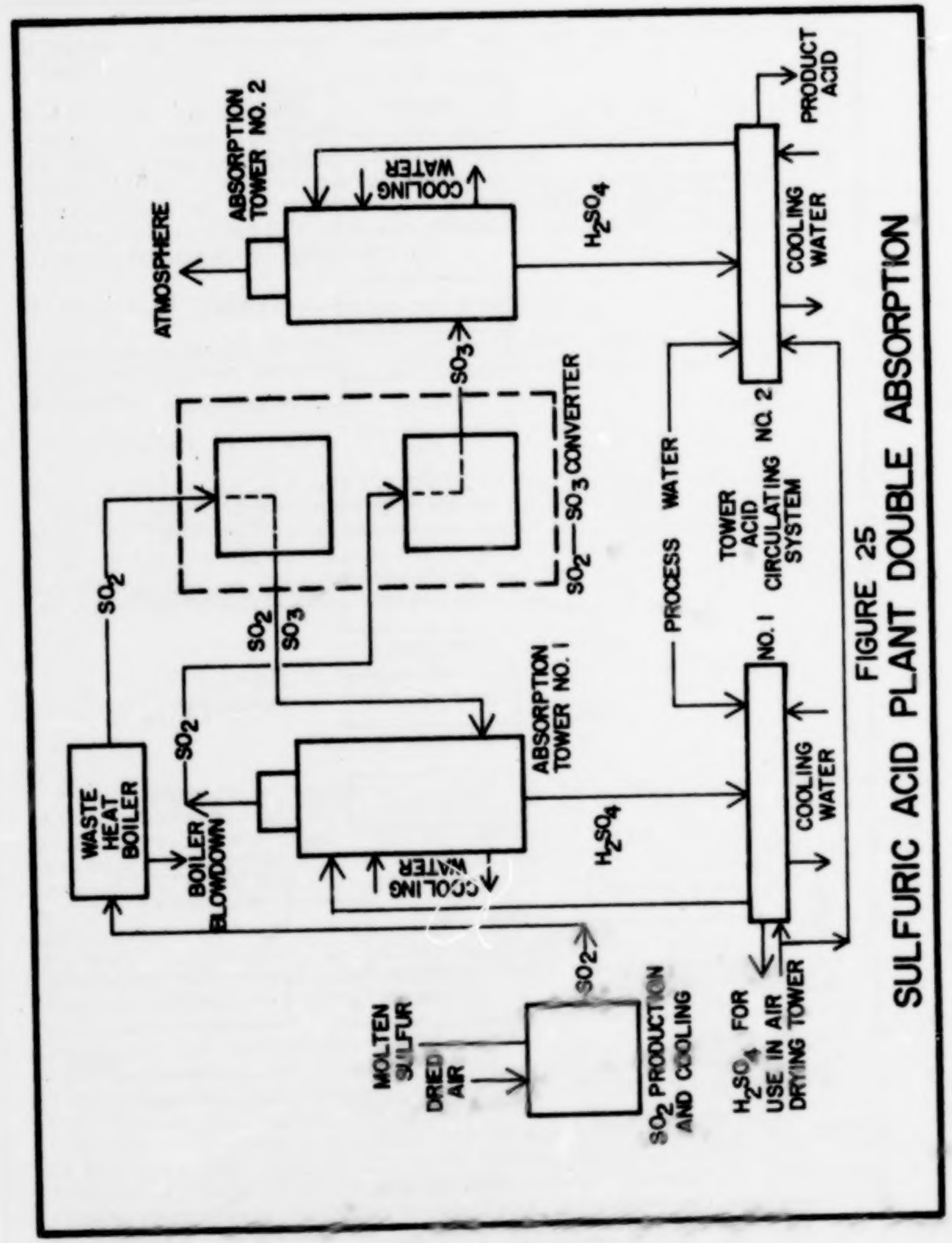

FIGURE 25
SULFURIC ACID PLANT DOUBLE ABSORPTION

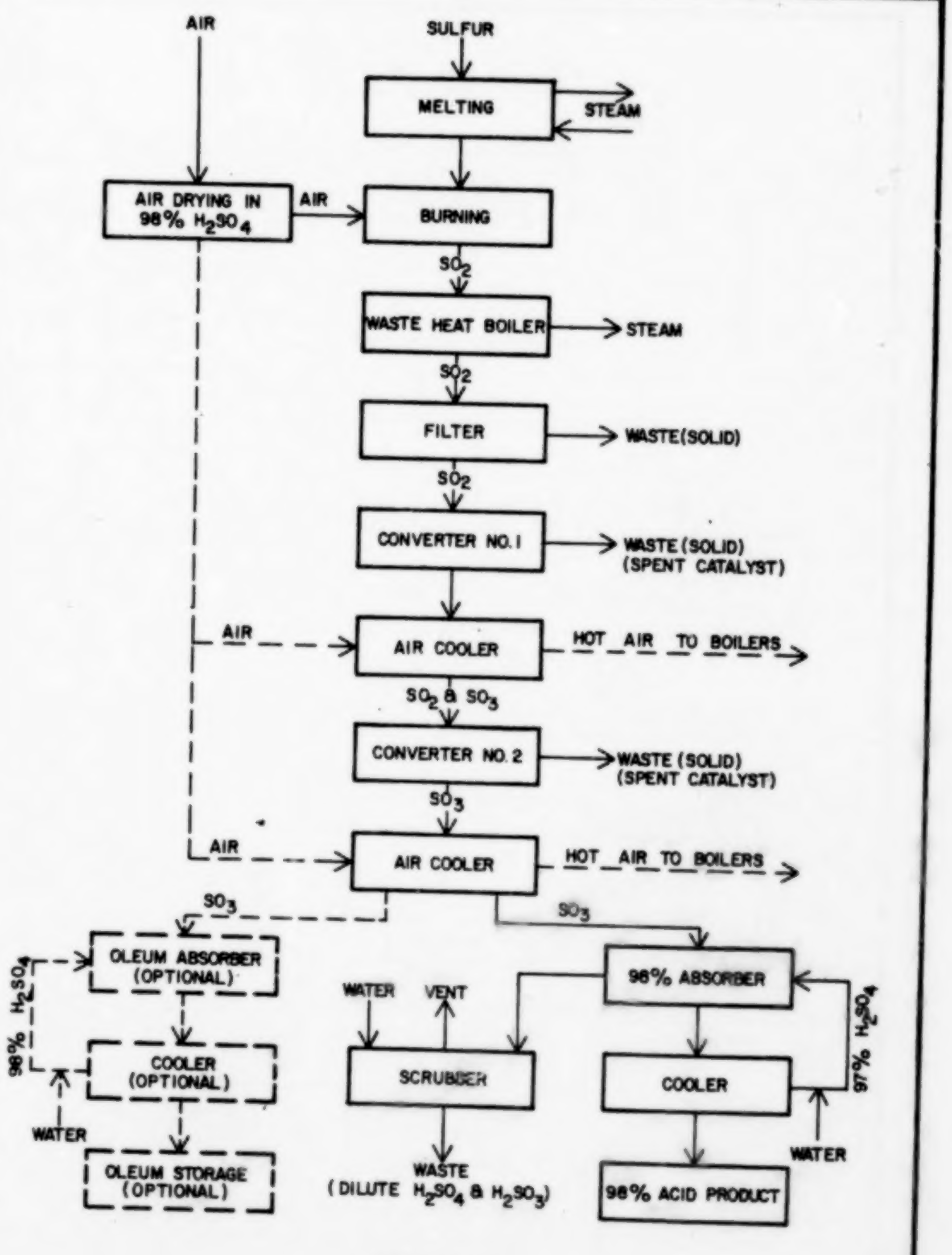

FIGURE 26
STANDARD SULFURIC ACID SINGLE ABSORPTION FLOW DIAGRAM (CONTACT PROCESS)

creates a water-borne waste not present in double absorption plants.

Total U.S. production in 1971 was 26,685,916 kkg (29,422,179 tons). About 60 percent of this production is captive, much of it supplying the fertilizer, petroleum refining, and explosive industries. There are many other large-tonnage industrial uses, including the manufacture of synthetic plastics, detergents, hydrofluoric acid, nuclear fuels, and various other organic and inorganic chemical products.

Titanium Dioxide

Titanium dioxide is the most widely used white pigment. It is produced by two methods, the "sulfate" process and the "chloride" process.

a) Chloride process

In the chloride process, shown in Figure 27, titanium dioxide (TiO_2) ores are chlorinated to produce titanium tetrachloride. Coke is included to promote the reaction. The resulting titanium tetrachloride is oxidized to titanium dioxide and chlorine which is recycled. A general reaction scheme using rutile ($Fe_2O_3 \cdot TiO_2$) as the raw material is shown below:

Chlorination Reaction

$$TiO_2Fe_2O_3 + 2Cl_2 + C \quad TiCl_4 + CO_2 + FeCl_3$$

Oxidation Reaction

$$TiCl_4 + O_2 \longrightarrow TiO_2 + 2Cl_2$$

The chlorination reaction above is only approximate because the iron chloride which results may be a mixture of several chlorides, and some carbon monoxide is formed. The actual products and product ratios will depend on the composition of the raw material and the reactant ratios used.

Impurities in the system, including the iron and other metal (Al, V, etc.) chlorides, entrained coke and ore, carbon monoxide and dioxide, and hydrogen chloride all have to be removed prior to the oxidation reaction, creating a significant effluent waste control problem. After chlorination the products are cooled to condense the undesired metal chlorides. Solids are separated by centrifugation or filtration, and the gaseous titanium tetrachloride is condensed. Noncondensable reaction gases containing titanium tetrachloride, silicon tetrachloride and hydrogen chloride are water scrubbed, then vented. A number of techniques are used to further purify the tetrachloride, removing traces of silicon, vanadium, magnesium, manganese, aluminum, and chromium. These techniques include distillation, adsorption, ion exchange, and chemical precipitation with hydrogen sulfide,

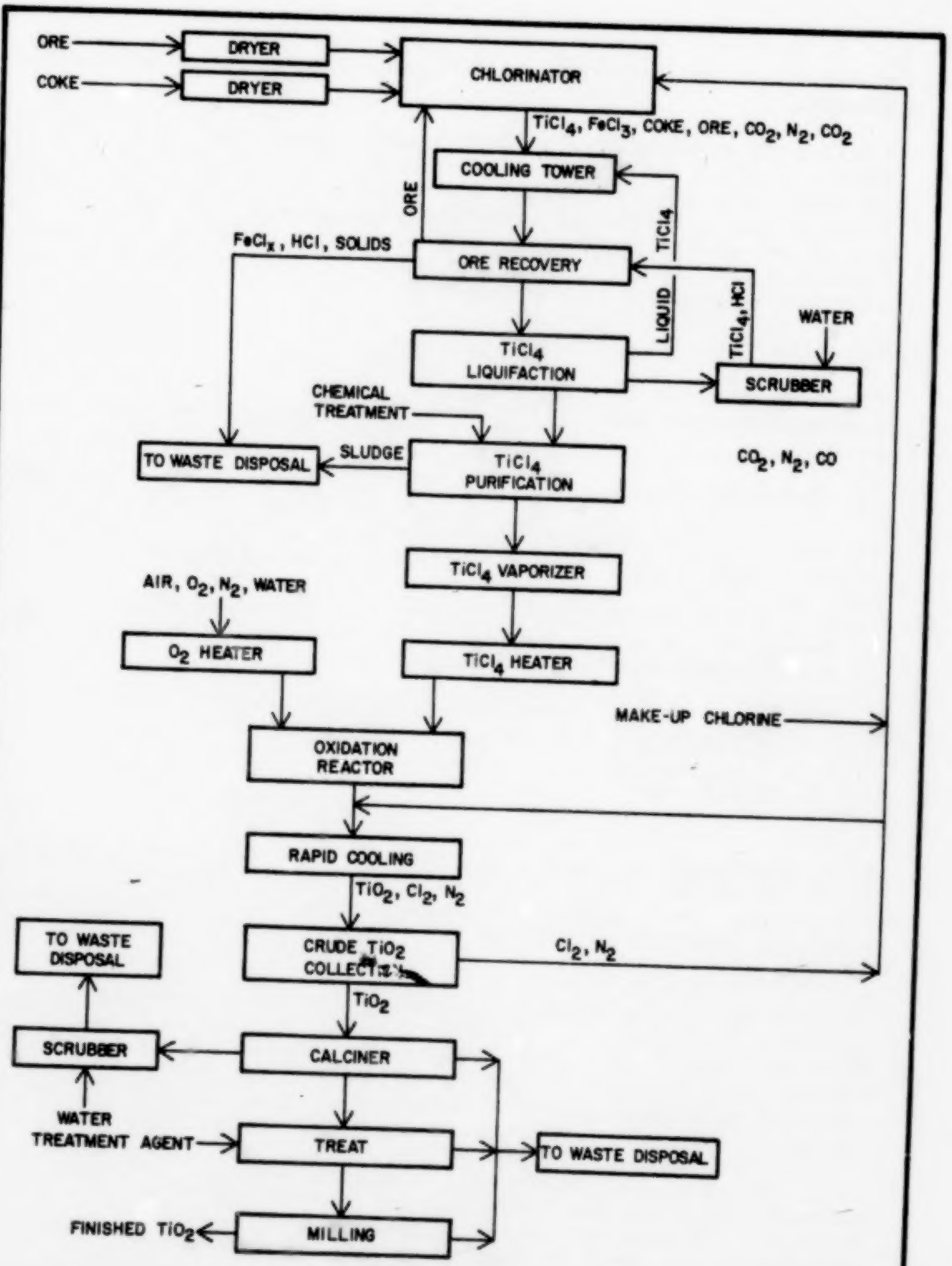

FIGURE 27
STANDARD CHLORIDE PROCESS TITANIUM DIOXIDE FLOW DIAGRAM

inorganic salts, or organic compounds. All techniques yield a pure titanium tetrachloride solution and a sludge which is slurried in water.

After purification, the titanium tetrachloride is vaporized and passed into a reactor with heated air or oxygen. The solid titanium dioxide particles are mechanically separated from the gas stream, calcined, ground, surface-treated, and packed.

b) Sulfate process

In the sulfate process, titanium dioxide-bearing ores are dissolved in sulfuric acid at high temperatures to produce titanium sulfate as an intermediate product. In some cases, small amounts of antimony trioxide are also added. The acid solution is clarified, a portion of the iron sulfates is removed by crystallization, and the titanium sulfate is hydrolyzed to form a white, non-pigmentary hydrate. The hydrate is calcined to form crystalline titanium dioxide, which is milled, surface treated, and packaged for sale. Product quality from the sulfate process is not so dependent on ore quality as is that from the chloride process.

A general reaction scheme using ilmenite containing various iron oxides (FeO and Fe_2O_3) is presented below:

Acidification

$$FeO(Fe_2O_3).TiO_2 + 5H_2SO_4 \rightarrow FeSO_4 + Fe_2(SO_4)_3 + TiOSO_4 + 5H_2O$$

Hydrolysis to Form Hydrate

$$TiOSO_4 + 2H_2O \rightarrow TiO_2.H_2O + H_2SO_4$$

Calcination

$$TiO_2.H_2O + Heat \rightarrow TiO_2 + H_2O$$

After acidifications the solutions are clarified, cooled and sent to a vacuum crystallizer. There, ferrous sulfate crystallizes out and is separated from the mother liquor by centrifugation. This material is either sold or disposed of as a waste.

The mother liquor is clarified by filtration after addition of filter aids and further concentrated by vacuum evaporation. Seed crystals or other nucleating agents are added and the concentrated liquor is treated with steam to hydrolyze the titanyl sulfate present. This precipitates as acidic hydrated titanium. The precipitate is collected by filtration, washed several times and calcined at 900-950°C to yield titanium dioxide. This calcined product is ground, and further processed to yield a purer product. A standard process flow diagram is given in Figure 28.

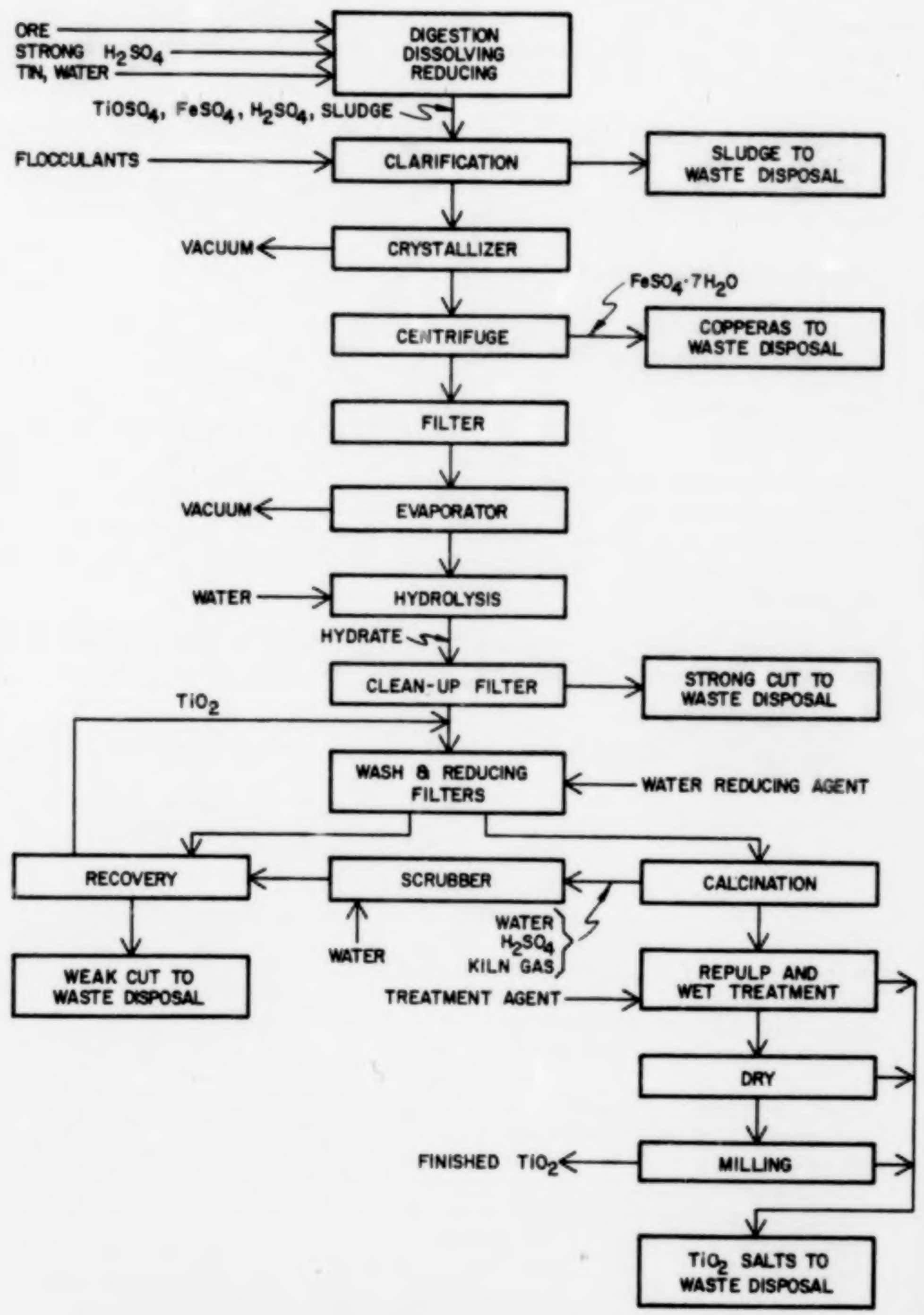

FIGURE 28
STANDARD SULFATE PROCESS TITANIUM DIOXIDE FLOW DIAGRAM

Various grades, purities, and surface finishes of several crystalline forms are sold commercially. Although the paint industry is the major user, various types of titanium dioxide are used in paper, inks, fabrics, rubber, and floor coverings. Total U.S. production in 1971 was 614,720 kkg (677,751 tons). Domestic ore is found in New York and Florida, plus lesser amounts in North Carolina, Virginia, and Idaho. The remaining ore supply is imported, much of it from Canada and India. Most of the production of this pigment is captive to the large paint manufacturers.

SECTION IV

INDUSTRY CATEGORIZATION

For the purpose of establishing effluent limitation guidelines for existing point sources and standards of performance for new sources, the inorganic chemicals manufacturing category has been segmented into subcategories based on the specific inorganic product manufactured. In cases where one chemical is produced by dissimilar processes, the product subcategory has been further subdivided. Although similar waste water constituents may be generated from various product groupings, as shown in Figure 29, and may be treated to similar concentrations, water requirements are specific for each chemical manufacturing process. Guidelines based on production volume must reflect this difference.

The separation of each product into individual subcategories simplifies the application of the effluent guidelines and standards of performance by providing unambiguous direction as to the application of a standard to a given point source. This is critical because of the great variety of product mix in existing facilities. The substantial advantage of clarity outweighs any technical advantages of product grouping.

In developing effluent limitations and standards of performance, it was necessary to examine numerous factors to determine whether additional segmentation of the industry is justified. The factors considered include:

(a) Waste water constituents
(b) Treatability of waste waters
(c) Manufacturing process
(d) Plant age
(e) Plant size
(f) Product mix
(g) Raw materials
(h) Air pollution control devices
(i) Geographical location.

A summary of the rationale employed in determining whether these factors necessitate further subcategorization is presented below.

(a) Waste water constituents.

The selected subcategorization scheme reflects gross differences in the raw waste loads generated from different chemical manufacturing processes. While it is recognized that the character and quantities of waste water pollutants may vary within a product subcategory, this difference is not sufficient to justify additional segmentation. When two different processes

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used to manufacture the same chemical generate dissimilar waste water constituents, they have been considered individually.

(b) Treatability of waste waters.

The treatability of waste water is determined largely by the volume of waste water and by the type of pollutants present. Thus, the above discussion on waste water constituents is applicable here.

(c) Manufacturing process.

Establishing subcategories based on product manufactured generally reflects differences between various manufacturing processes. The product subcategories are further segmented if two dissimilar manufacturing processes are commonly used.

(d) Plant age.

The relative age of plants within a product subcategory are determined by obsolesence due to process or equipment changes and not physical age. Hence, plant age is not an appropriate basis for subcategorization. No correlation between plant age and effluent quality is evident from plant data.

(e) Plant size.

Plant size generally has little effect on the quality of waste water generated from various chemical manufacturing processes. Although treatment costs per unit of production are somewhat lower when large quantities of water are treated, this difference is not sufficiently great to warrant further segmentation of the industry.

(f) Product mix.

Chemical plants vary greatly in terms of the number and types of products manufactured. More treatment options and a greater reuse potential exist in plants manufacturing many chemicals. However, treatment alternatives exist for small and single-product plants, such that additional subcategorization is unnecessary.

(g) Raw materials

Different raw materials are obviously used to manufacture different products. This difference is reflected in the selected subcategorization scheme. However, within a product subcategory raw materials of varying degrees of purity are used. Because ore beneficiation and cleaning may be used to treat impure ores, raw material quality does not justify further segmentation of the industry. In certain cases different raw materials do not alter

the treatability of the process effluent. This is demonstrated in aluminum sulfate production where bauxite or aluminum clays are used as the source of aluminum.

(h) Air pollution control devices.

The type of system used to control air pollution will have an effect on the water treatment requirements of a given plant. Wet scrubbing solutions are the only source of waste water in some chemical manufacturing processes. In general, scrubbing solutions may be treated and recycled or reused. In some cases, this solution may be sold as a weak product solution. Product recovery justifies conversion to a dry bag collection system for some manufacturing processes. Because of the options available to economically treat, sell, recycle, reuse or eliminate scrubbing solutions, it was considered unnecessary to subcategorize according to methods of air pollution control.

(i) Geographical location.

Geographical location is important in analyzing the feasibility of various treatment alternatives. Evaporation ponds are functional only in areas where net evaporation exceeds rainfall. Ocean dumping and deep-well disposal are possible only in certain areas, and must be consistent with local, State and Federal laws. The possibility of ground water contamination may preclude the use of unlined holding and settling ponds in many locations. The location of a plant, therefore, is an important factor in selecting the appropriate treatment technologies for a specific plant. Because alternative treatment systems are available to accommodate differences in climate, geology, etc., additional subcategorization based on plant location is not justified. Allowances have been provided to permit discharges from impoundment in locations where rainfall exceeds evaporation.

The product subcategories are shown below with process subdivisions where required:

- Aluminum chloride
- Aluminum sulfate
- Calcium carbide
- Calcium chloride
- Calcium oxide and calcium hydroxide
- Chlorine and sodium or potassium hydroxide
    - a. mercury cell process
    - b. diaphragm cell process
- Hydrochloric acid
- Hydrofluoric acid
- Hydrogen peroxide
    - a. electrolytic process
    - b. organic process
- Nitric acid

Potassium metal
Potassium dichromate and potassium sulfate
Sodium bicarbonate
Sodium carbonate
Sodium chloride
  a. brine-mining process
  b. solar evaporation process
Sodium dichromate and sodium sulfate
Sodium metal
Sodium silicate
Sodium sulfite
Sulfuric acid
Titanium dioxide
  a. chloride process
  b. sulfate process.

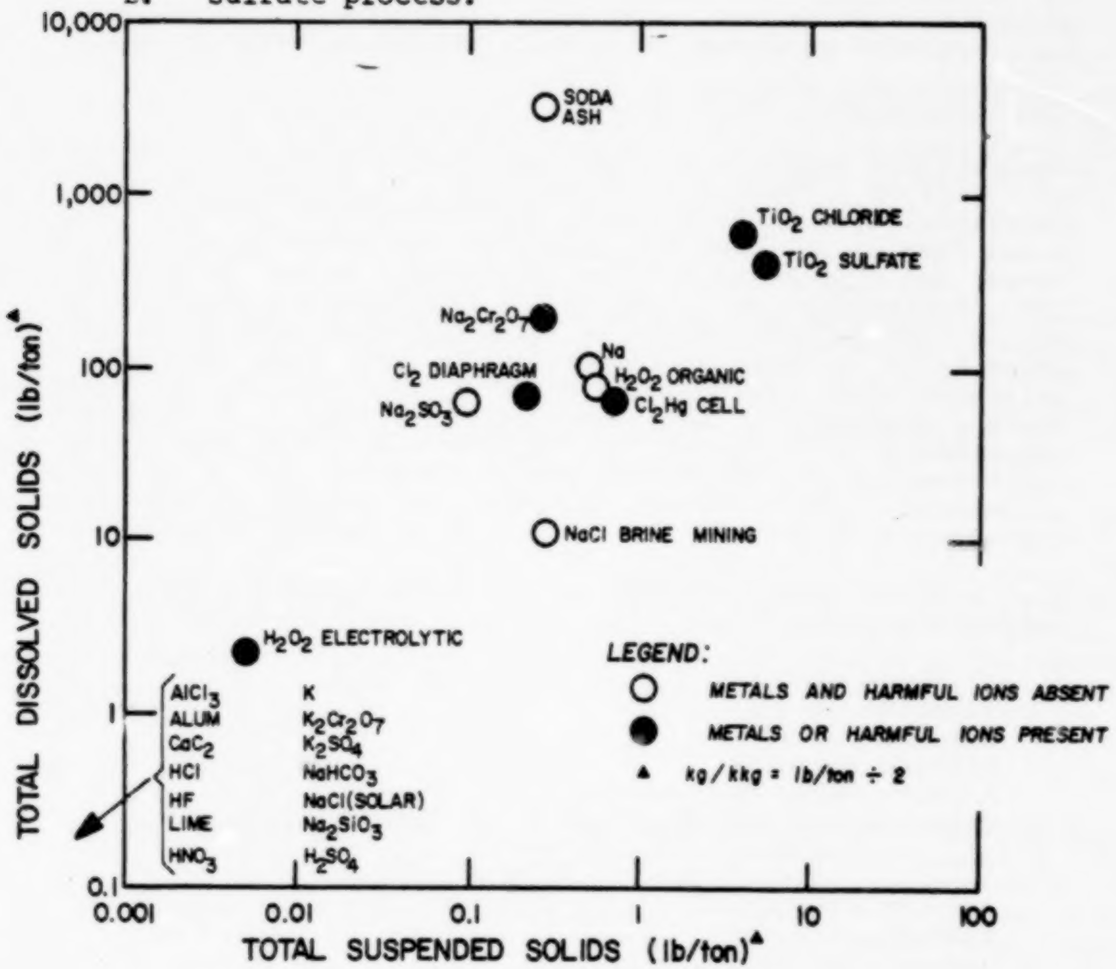

FIGURE 29
INDUSTRY CATEGORIZATION OF
INORGANIC CHEMICALS MANUFACTURING

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SECTION V

WATER USE AND WASTE CHARACTERIZATION

This section discusses the specific water uses required in the manufacturing processes for the inorganic chemicals studied, and the amounts of waste effluents contained in these waters. The process wastes are characterized as raw waste loads emanating from a typical process before treatment and the amount of water-borne waste effluent after treatment. Also included in this discussion are verification sampling data measured at specific plants for each of the chemical subcategories set forth in Section IV. A description of the analytical techniques used for this verification of plant data is also provided.

GENERAL WATER USES

Water is used in inorganic chemical manufacturing plants for six principal purposes, plus other miscellaneous uses. The principal uses are:

1) Cooling -- Non-contact cooling water
2) Process -- Contact cooling or heating water
   Contact wash water
   Transport water
   Product and dilution water
3) Auxiliary water

The effluent guidelines developed in the document are to be applied to process waste water pollutants only. This includes those waste water constituents in water which directly contacts the product, by product, intermediate, raw material, or waste product. The guidelines do not include noncontact cooling water, or wastes resulting from steam or water supply. Guidelines for these waste streams will be developed in a separate study at a later date.

Non-Contact Cooling Water

Many chemical processes operate more quickly or more efficiently at high temperatures or generate heat. Cooling water is often used to control or reduce these temperatures. If the water is used without contacting the reactants, such as in a tube-in-shell heat exchanger or trombone cooler, then the water will not be contaminated with process effluent. If, however, the water contacts the reactants, then contamination of the water results and the waste load increases.

The non-contact cooling water in the industry is of two types. The first type is recycled cooling water which is cooled by cooling towers or spray ponds. The second type is once-through

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cooling water whose source is generally a river, lake or tidal estuary, and this water is usually returned to its source.

The only waste effluent from recycled water would be water treatment chemicals and the cooling tower blowdown which generally is discharged with the cooling water. The only waste effluent from the once-through cooling water would be water treatment chemicals which are generally discharged with the cooling water. The cooling water tower blowdown may contain phosphates, nitrates, nitrites, sulfates and chromates. The water treatment chemicals may consist of alum, hydrated lime, or alkali metal ions (sodium or potassium) arising from ion exchange processes. Regeneration of the ion exchange units is generally accomplished with sodium chloride or sulfuric acid, depending upon the type of unit employed.

Contact Cooling or Heating Water

This water comes under the general heading of process water because it comes into direct contact with process reactants. This type of water is used by steam drum dryers and barometric condensers. Water is required in very large quantities for use in the barometric condensers used to provide reduced pressure for the operation of multiple effect evaporators. For a large triple-effect evaporator, such as that used for salt evaporation, flows of 3,800-41,600 cu m/day (1 to 11 million gallons per day) are not unusual. A waste effluent problem with the barometric condenser usage arises from the product vapors and carry-over from the last effect (stage) of the evaporator which are entrapped in the flow of condenser water.

Other direct contact cooling or heating water usage such as that for contact steam drying, steam distillation, pump and furnace seals, etc., is generally of much lower volume than the barometric condenser water.

Contact Wash Water

This water is considered process water because it comes into direct contact with either the raw material, reactants or products. Examples of this type of water usage are ore washing to remove fines filter cake washing to remove entrained particles, cleansing of insoluble product vapors, and absorption processes wherein water is reacted with a gaseous material to produce an aqueous solution.

Transport Water

Water is often used in the inorganic chemicals manufacturing industry for transporting reactants or products to various unit operations either in solution, suspension or slurry form. A good example of this is solution-mined salt or brine. Water is pumped

into a salt cavity at the rate of 3900 l/kkg (936 gal/ton) of salt. The salt is dissolved, and the resulting brine is forced to the surface under pressure where it can be fed to evaporators to produce dry salt, or fed to electrolytic cells where it is used to produce chlorine and alkali. Wastes resulting from these types of operations are generally dilute solutions or suspensions which could be reused upon concentration or could be returned to the source. In cases where transport water is carrying a solid product, it normally is separated from the product by filtration, evaporation, or drying. The resultant liquor or condensate generally contains dissolved product, reactants or impurities.

Product Water

The product water generally is that which comes in contact with and becomes an integral part of the product. Typical examples include digestion water used for sodium silicate manufacture and water used in acid absorption towers. Likewise, water may be added to a highly concentrated product to form a more dilute product. The source of these waters is generally fresh water supplies, steam condensate, dilute product streams, or a combination of these sources.

Auxiliary Process Water

This water is used for auxiliary operations such as ion exchange regenerants, make-up water to cooling towers with a resultant cooling tower blowdown, make-up water to boilers with a resultant boiler blowdown, and storage and shipping tank washing. The water effluents from these operations are generally low in quantity but highly concentrated in waste materials.

Miscellaneous Water Uses

These water uses vary widely among the plants with general usage for floor washing and cleanup, safety showers and eye wash stations, sanitary uses, and storm run-off. The resultant streams are either not contaminated or only slightly contaminated with wastes. In instances where process residues collect where they can be washed away by storm waters, as for example, dusts on the exterior of process buildings, storm run-off can constitute a serious contamination problem.

PROCESS WASTE CHARACTERIZATION

Aluminum Chloride

Aluminum chloride is made by reaction of chlorine with molten aluminum. The aluminum chloride formed vaporizes and is collected on air cooled condensers. The tail gases leaving the condensers are the only source of wastes downstream of the reaction zone. Plant 125 is the exemplary plant for this production process. Figure 30 shows a scrubber system for this plant.

In the process described above, there are two sources of waste-uncondensed aluminum chloride and chlorine in tail gases and unreacted aluminum metal. At the exemplary facility, the first waste is utilized to manufacture another product and the unreacted aluminum is disposed of as a solid waste.

The raw waste loads are shown below:

Waste Product	Source	kg/kkg of Product (lb/ton) Average	Range
$AlCl_3$	Tail Gases	80 (160)	64-96 (128-192)
Unreacted Aluminum	Reactor	22 (44)	

At the exemplary plant there is an integrated blower system to exhaust the plant, packing station, condensers, etc. All blower exhaust is treated in an absorption tower where, as shown in Figure 30, the aluminum chloride and chlorine vapors are absorbed into a recycling scrubber system. From this scrubber, about 121 l of solution/kkg of product (29 gal/ton) are drawn off, filtered and further treated to produce a 28 percent aluminum chloride solution which is sold. There are no waste streams. The water input and use for the scrubber system is an equivalent volume. This water is supplied from a well for makeup to the system. None of this is recycled. It is used to make 28 percent solution product.

The characteristics of the 28 percent aluminum chloride solution recovered for sale are tabulated below:

Aluminum Chloride Solution
ACS-0002
Technical Grade

$AlCl_3$ percent	28 min.
Baume' at 15°C	32° min.
Total aluminum as aluminum oxide, percent	10.5 min.
Color, APHA	100 max.
Free Aluminum, percent	0.1 max.
Fe	25 mg/l

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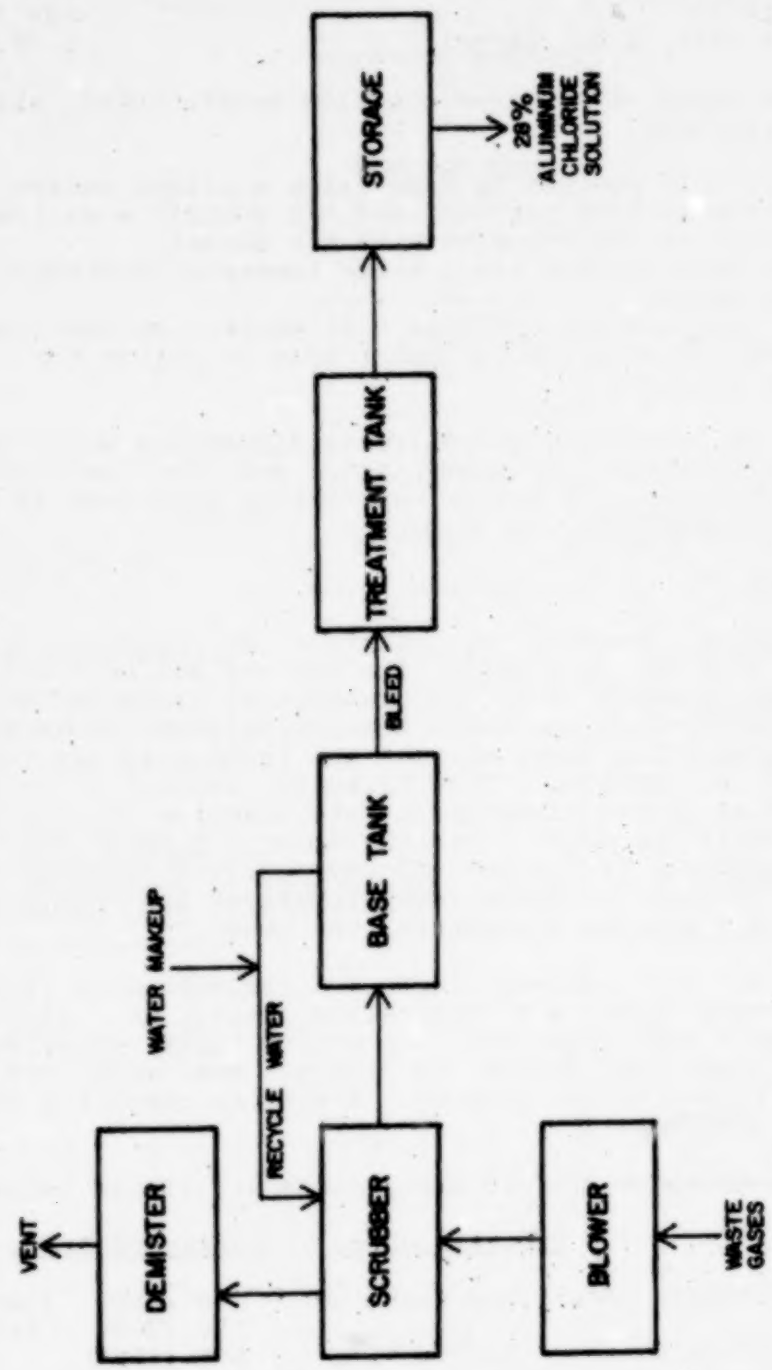

FIGURE 30
SCRUBBER SYSTEM FOR TREATMENT OF ALUMINUM CHLORIDE WASTES AT PLANT 125

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Heavy metals	10 mg/l
Sulfate	500 mg/l
Free Acidity as percent HCl	0.2 max.
Freezing point	-34 (-30)
Density at 15°C, g/cc (lb/gal)	1.28 (10.7)

There are three types of aluminum chloride manufactured, all from the same process:

1. Yellow -- this product is made using a slight excess of chloride (0.0005 percent) and may contain some iron due to reaction of the chlorine with the vessel.
2. White -- this product has a stoichiometric aluminum/chloride ratio.
3. Grey -- this product contains 0.01 percent excess aluminum. The unreacted aluminum raw waste load is higher for the grey material.

Industrially, it generally makes little difference which of the above grades is employed. In some pigment and dye intermediate applications, however, the yellow material is preferred as it is free of elemental aluminum.

Aluminum Sulfate

Aluminum sulfate is prepared by reaction of bauxite ore or aluminum clays with sulfuric acid. The ore and sulfuric acid are reacted in a digester and the resulting aluminum sulfate solution, containing muds and other insolubles from the ore, is then fed to a settling tank, wherein the insolubles are removed by settling and filtration. The filtered product liquor is either shipped as liquid aluminum sulfate solution or evaporated to recover a solid product. Two exemplary plants for this product were studied, plants 049 and 063. Figure 31 shows a detailed process diagram including waste treatment for one plant, and Figure 32 is a similar diagram for the other.

Raw wastes from the process include insoluble muds from the digester, settling tank and filtration unit, as well as washwaters from vessel cleanouts. At one facility, these wastes are treated in a settling basin to remove the muds and the supernatant is reused in the process. A similar recycling system is used in the other facility.

Raw wastes from aluminum sulfate manufacture are listed below:

Waste Products	Process Source	kg/kkg of Product (lb/ton)	
Spent aluminum sulfate muds	Mud washing	170 (340) 100 (200)	(two different facilities)
Low aluminum sulfate water	Mud washing	800 (1600)	

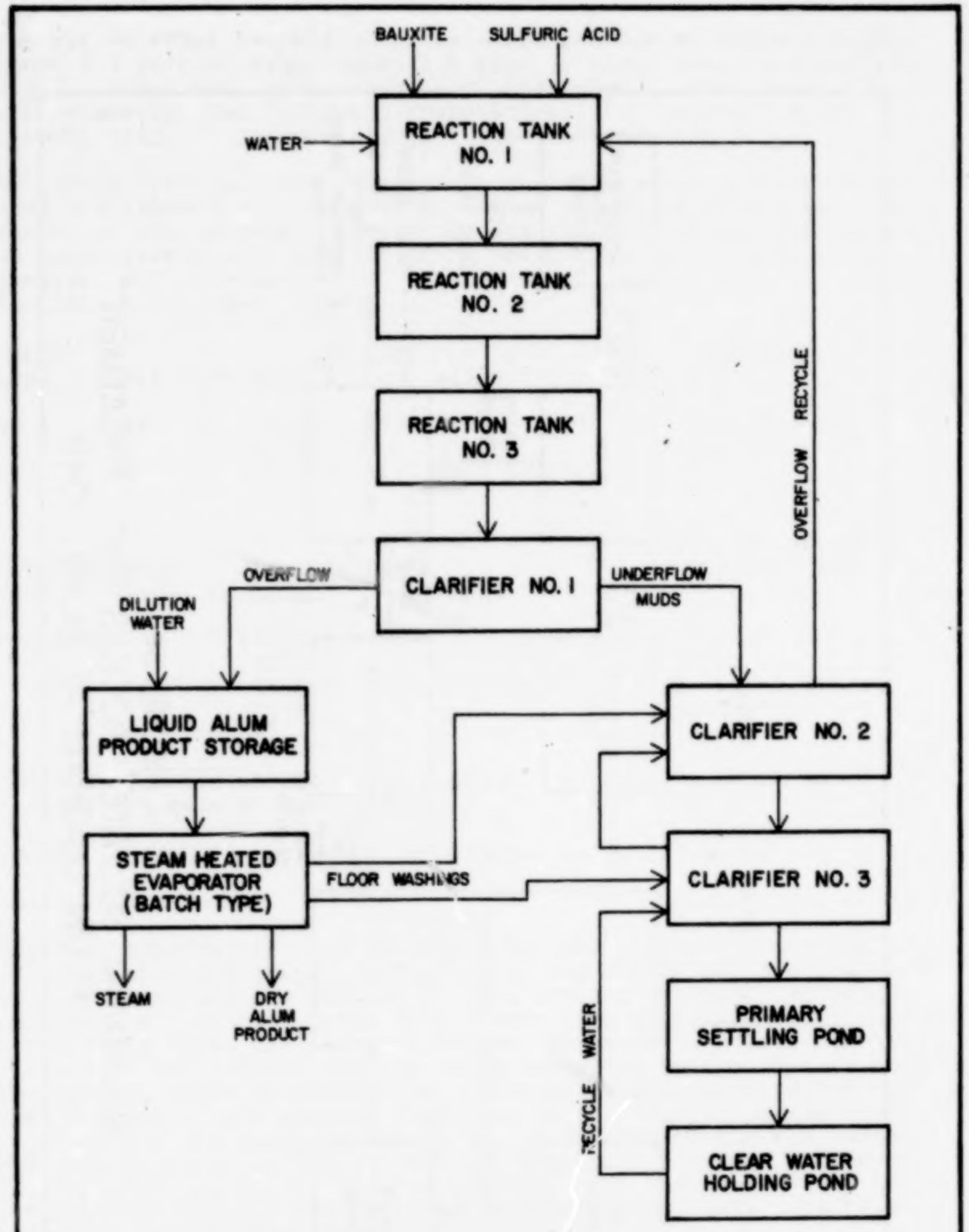

FIGURE 31
ALUMINUM SULFATE PROCESS AND TREATMENT FLOW DIAGRAM AT PLANT 063

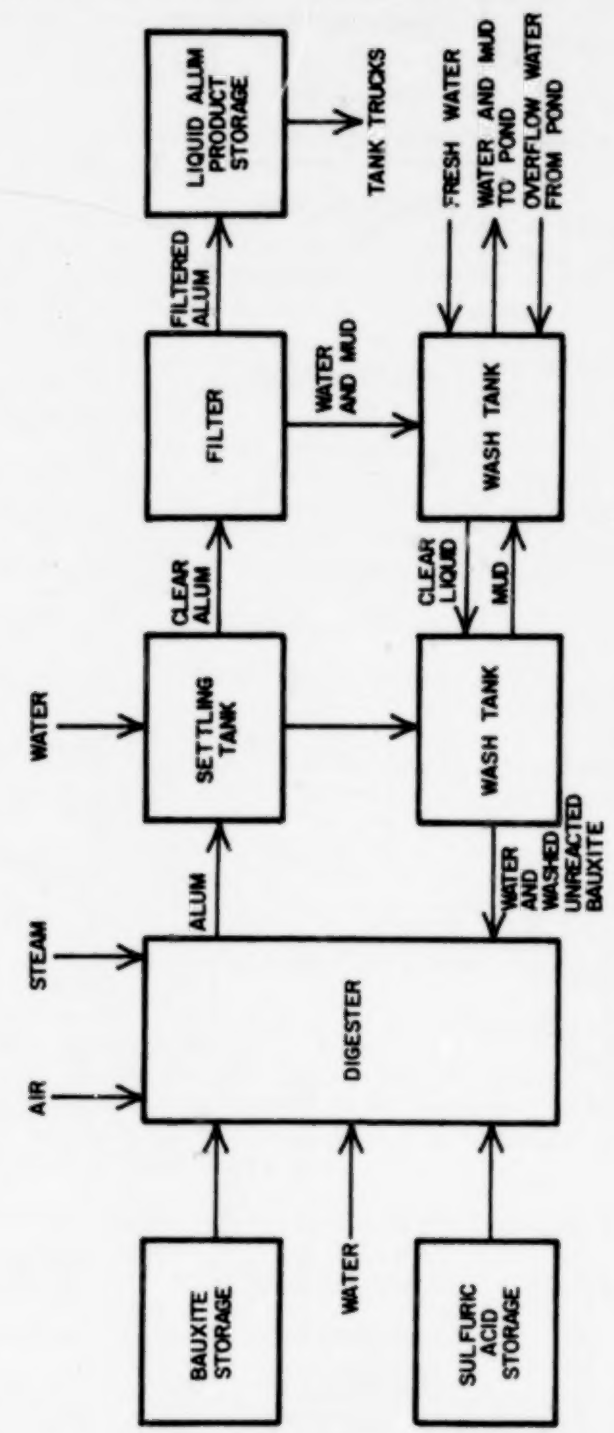

FIGURE 32
ALUMINUM SULFATE PROCESS AND TREATMENT
FLOW DIAGRAM AT PLANT 049

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The raw material bauxite contains 54-56 percent of soluble Al_2O_3, about 3.5 percent TiO_2, about 5.5 percent SiO_2, about 1.5 percent Fe_2O_3 and the rest water of hydration. The muds have, approximately, the following compositions: 40 percent SiO_2, 40 percent TiO_2, 20 percent Al_2O_3, 0.5 percent $Al_2(SO_4)_3$.

At these plants, all waters are fed to a settling basin where muds are removed and impounded. The clear effluent is then reused in the process. Provisions are established for collection of all leaks and spills which are pumped to the impoundment, treated and recycled. A breakdown of water use at both facilities is shown below:

Input Type	Plant	Quantity cu m/day	Quantity l/kkg	Comments
Well	049	47 (12,400 gpd)	1650 (396 gal/ton)	No Pretreatment Required for
Well	063	76 (20,000 gpd)	2090 (500 gal/ton)	Either

Process Water Type	Plant	Quantity cu m/day	Quantity l/kkg	Percent of Process Stream Recycled
Process	049	77 (20,400 gpd)	2720 (652 gal/ton)	30*
Process	063	87 (23,000 gpd)	2400 (575 gal/ton)	All excess process water*

*Remaining water shipped with product. Aluminum sulfate solutions are made at both plants.

These plants have no process or cooling water effluent.

Calcium Carbide

Calcium carbide is manufactured by the thermal reaction of calcium oxide and coke. Calcium oxide and dried coke are reacted in a furnace, and the product is then cooled, crushed, screened, packaged and shipped. The only wastes from the process are airborne dusts from the furnace, coke dryer and screening bag filters. Bag filters are now being installed in the furnace and the packing areas of plant 190. All collections are returned to the furnace. The process locations of the sources of raw waste in plant 190 are shown in Figure 33. A listing of the raw wastes and amounts is given below. All but the cooling tower blowdowns are treated by dry collection methods. The blowdown wastes are intermittent and are currently untreated. This data was furnished by the manufacturer.

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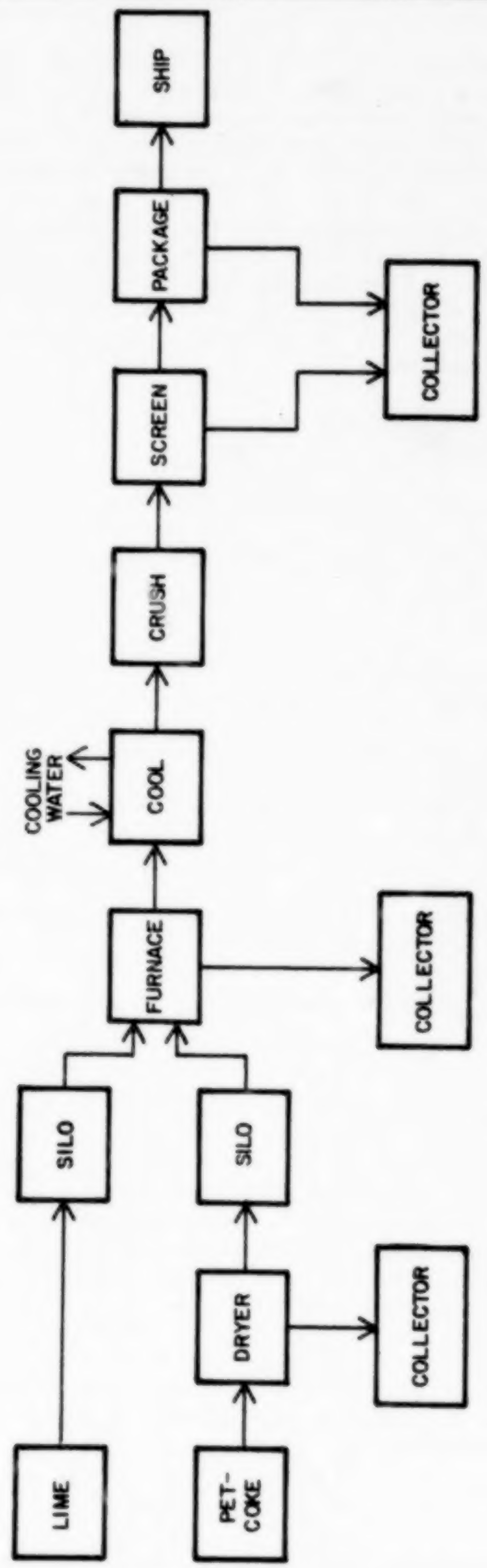

FIGURE 33
CALCIUM CARBIDE PROCESS FLOW DIAGRAM AT PLANT 190

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Waste Product	kg/kkg of Product (lb/ton) Average	Range
1. Fine Petroleum Coke	50 (100)	30-70 (30-140)
2. Stack Dust	85 (170)	70-115 (140-230)
3. Packing Dust	10 (20)	6-11 (12-22)
4. Cooling Tower Blowdown Solids and Cooling Water Treatment Chemicals		0.5-1 (1-2)

The first waste is collected by bag filters and recycled. Waste products 2 and 3 are now being exhausted to the air but will be collected and recycled by bag filters similar to those now collecting the coke fines. The fourth waste is currently untreated.

Figure 34 shows, schematically, the source and disposition of the water uses at this plant. Table 3 lists the effluent waste data supplied by plant 190 and verification measurements. (These data are the same as presented to the Corps of Engineers in plant 190's permit application, except for pH and flow, which were obtained during a plant visit).

Considerable amounts of chlorides and sulfates are discharged intermittently due to cooling tower blowdowns and use of water treatment chemicals.

Plant 190's policy is to recover and recycle all possible air-borne dusts by dry collection techniques. This approach eliminates all process water wastes. The cooling tower blowdown and incoming water treatment regenerants are the only water effluents. There is no process waste water effluent in this exemplary plant.

Calcium Chloride

Calcium chloride is produced by extraction from natural brines. Some material is also recovered as a by-product of soda ash manufacture by the Solvay process. The latter will be discussed in the soda ash section.

In the manufacture of calcium chloride from brines, the salts are solution mined and the resulting brines are first partly evaporated to remove sodium chloride by precipitation. The brine is further purified by addition of other materials to remove sodium, potassium and magnesium salts by precipitation and further evaporation. It is then evaporated to dryness to recover calcium chloride which is packaged and sold. Figure 35 shows the detailed separation procedure used at plant 185. Bromides and iodides are first separated from the brines before sodium chloride recovery is performed. There is a large degree of brine

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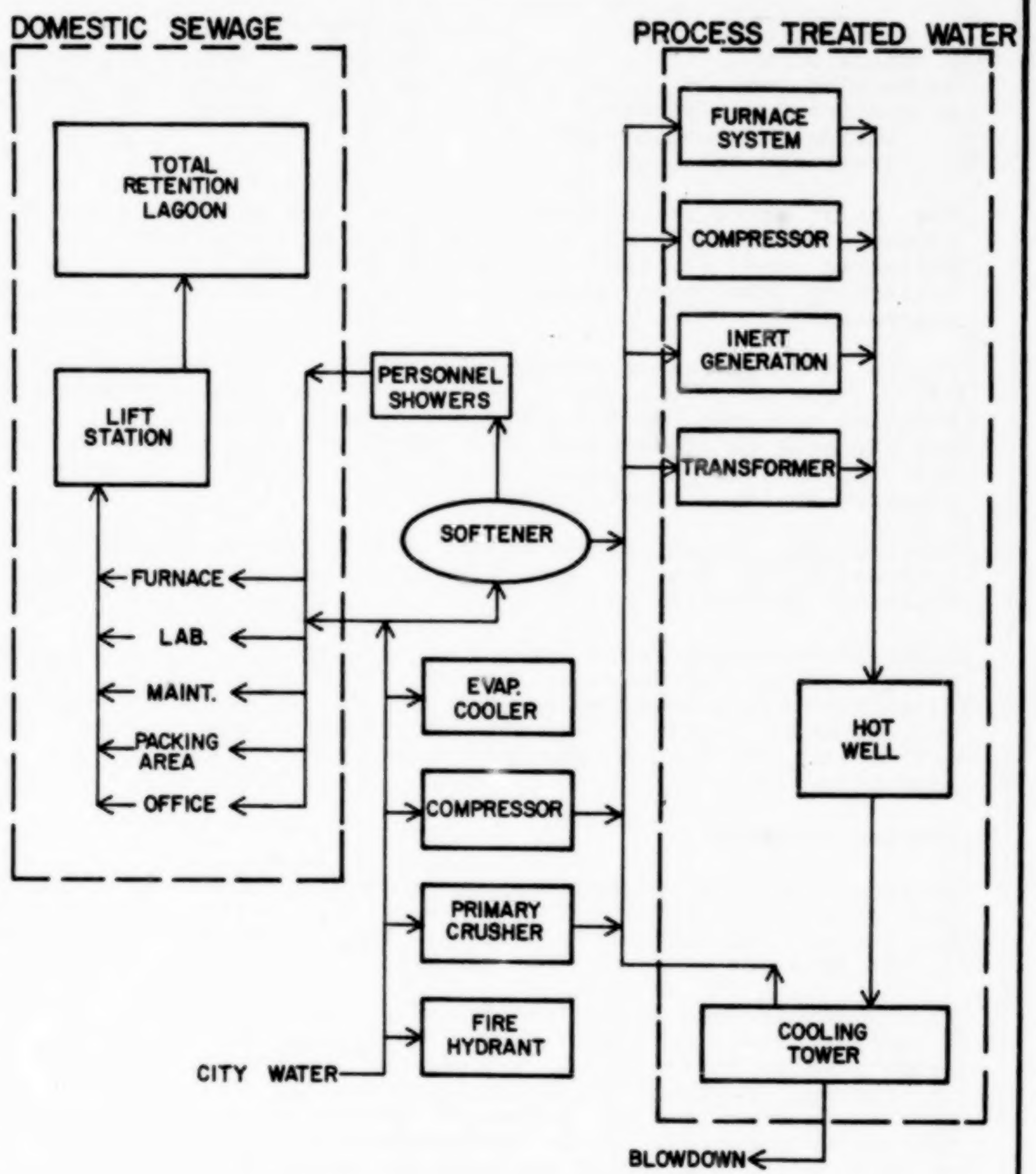

FIGURE 34
WATER USAGE AT PLANT 190
CALCIUM CARBIDE FACILITY

TABLE 3. Plant Effluent from CaC_2 Manufacture
(All units ppm unless specified)

Parameter	Intake Water Plant Data	Intake Water Verifcn.	Cooling Tower Water Plant Data	Cooling Tower Water Verifcn.
Total suspended solids	3.5	0	48	0
Flow (cu m/day)	152	(a,b)	13	(a,b)
Total dissolved solids	238	(a)	1930	(a)
Conductivity (as NaCl)	(c)	95-100	(c)	810
BOD	80	(a)	308	(a)
COD	15	25	170	75
pH	7.6	7.5	7.6	8.0
Alkalinity (as $CaCO_3$)	99	90	68	165
Nitrate (as N)	0.45	0.27	12	9.8
Zinc	0.01	(a)	2.8	(a)
Phosphorus Total (phosphate)	0.27	0.32	0.55	1.30
Color (APHA Units)	Nil	10	675	20
Aluminum	0.15	(a)	0.17	(a)
Turbidity (FTU)	0	5	18	10
Fluoride	0.45	(a)	0.95	(a)
Total hardness (as $CaCO_3$)	140	136	404	750
Calcium hardness (as $CaCO_3$)	(c)	118	(c)	675
Sulfate	55	51.5	290	690
Chloride	46	36	198	95
Iron	0.03	0.08	-	0.019
Chlorine (as Cl_2)	(c)	0	(c)	0.1

(a) Not measured
(b) Flow varied frequently, depending on response of level-monitoring valve
(c) Not in furnished data.

Note: Above data are not from split samples, but represent data furnished for Corps of Engineer permit application approximately two years prior to the verification measurements.

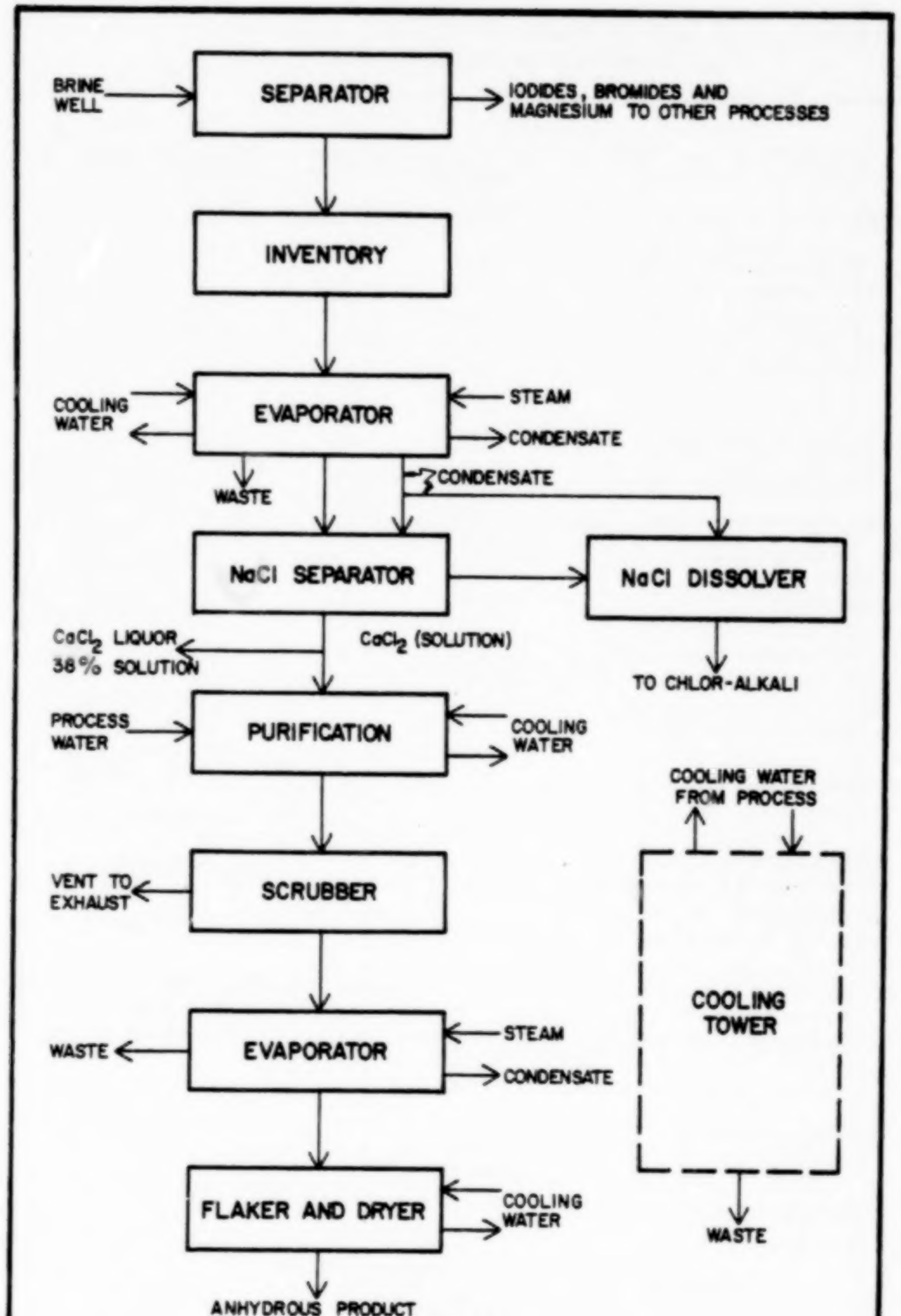

FIGURE 35
CALCIUM CHLORIDE FLOW DIAGRAM
AT PLANT 185

recycling to remove most sodium chloride values. The composition of the brine is:

$CaCl_2$	19.3 percent
$MgCl_2$	3.1 percent
NaCl	4.9 percent
KCl	1.4 percent
Bromides	0.25 percent
Other minerals	0.5 percent
Water	70.6 percent

The raw wastes expected from calcium chloride manufacture at plant 185 arise from blowdowns as well as from the several partial evaporation steps used. Most of the wastes are weak brine solutions:

Waste Products	Process Source	Avg. kg/kkg of Product (lb/ton)
NH_3	Evaporators	0.55 (1.1)
$CaCl_2$	Evaporators	29 (58)
NaCl	Evaporators	0.5 (1.0)
$CaCl_2$	Packaging	0.7 (1.4)
*NaCl & KCl	Brine Separation	45.5 (91)
*NaCl	Secondary Brine Separation	110 (220)

*Recycled or used elsewhere.

At plant 185, the waste brine streams are passed through an activated sludge treatment to remove organics and are then passed to a settling basin to remove suspended matter, adjusted to neutral pH, fed into a second pond to further settle suspended matter, and finally discharged. Future plans at plant 185 call for changes in the evaporators to reduce calcium chloride discharges and eliminate ammonia from the discharges. More recycling of spent brines is also planned. Table 4 gives a detailed breakdown of current water usage at plant 185.

Table 4A lists the river intake and effluent compositions at plant 185. The effluent consists mostly of weak brine solutions (neutral pH).

Calcium Oxide and Calcium Hydroxide

Calcium oxide is manufactured by thermal decomposition of limestone in a kiln. The limestone is first crushed, then added to the kiln, wherein it is calcined to effect decomposition. The product is then removed from the kilns, marketed as is, or slaked by reaction with water to produce calcium hydroxide. A process flowchart is given in Figure 36 descriptive of the general process at plant 007.

TABLE 4. Plant 185 Water Flows

A. Inputs

Type	cu m/day (MGD)	liters/kkg (gal/ton)
River (+ 44%)	31,100 (8.208)	62,700 (15,000)
Lake	545 (0.144)	1,100 (263)

B. Water Usage

Type	cu m/day (MGD)	liters/kkg (gal/ton)	% Recycled
Cooling	58,500 (15.5)	118,000 (28,300)	46
Process	164,000 (43.2)	330 (79)	0
Washdown	2,180 (0.576)	4,390 (1,052)	0
Washout	680 (0.180)	1,370 (329)	10

TABLE 4A Composition of Intake and Effluent Stream of Plant 185

Parameter*	Intake Plant Data	Intake Verification Measurement	Effluent Stream No. 1 Plant Data	Effluent Stream No. 1 Verification Measurement
Flow, cu m/day (MGD)	31,600 (8.35)	**	31,600 (8.35)	**
Total Suspended Solids	42	8	-	29
Total Dissolved Solids	353	293	2,693	309
BOD	3	-	1.1	-
COD	-	-	-	-
pH	8.3	8.3	6.7-8.0	9.1
Turbidity (FTU)	5.3	0	18.2	25
Color (ALPH Units)	20	70	60	80
Conductivity (NaCl)	476	520	5,390	340
Hardness (Ca)	200	179	700	169
Sulfate	110	36	312	36
Nitrate	0.2	0.29	0.2	20
Ammonia	0.1	0.60	2.0	8.8
Organic Nitrogen	0.2	-	2.7	-
Iron	0.4	0.30	1.0	0.09
Copper	-	-	-	-
Chromate	0.1	-	0.1	-
Manganese	0.05	-	0.1	-
Zinc	0.1	-	0.85	-
Total Alkalinity ($CaCO_3$)	160	170	67	235

* mg/l unless otherwise specified
**measurement not possible due to physical constraints of location
Note: Above data not split samples; plant data furnished separately, prior to sampling for verification.

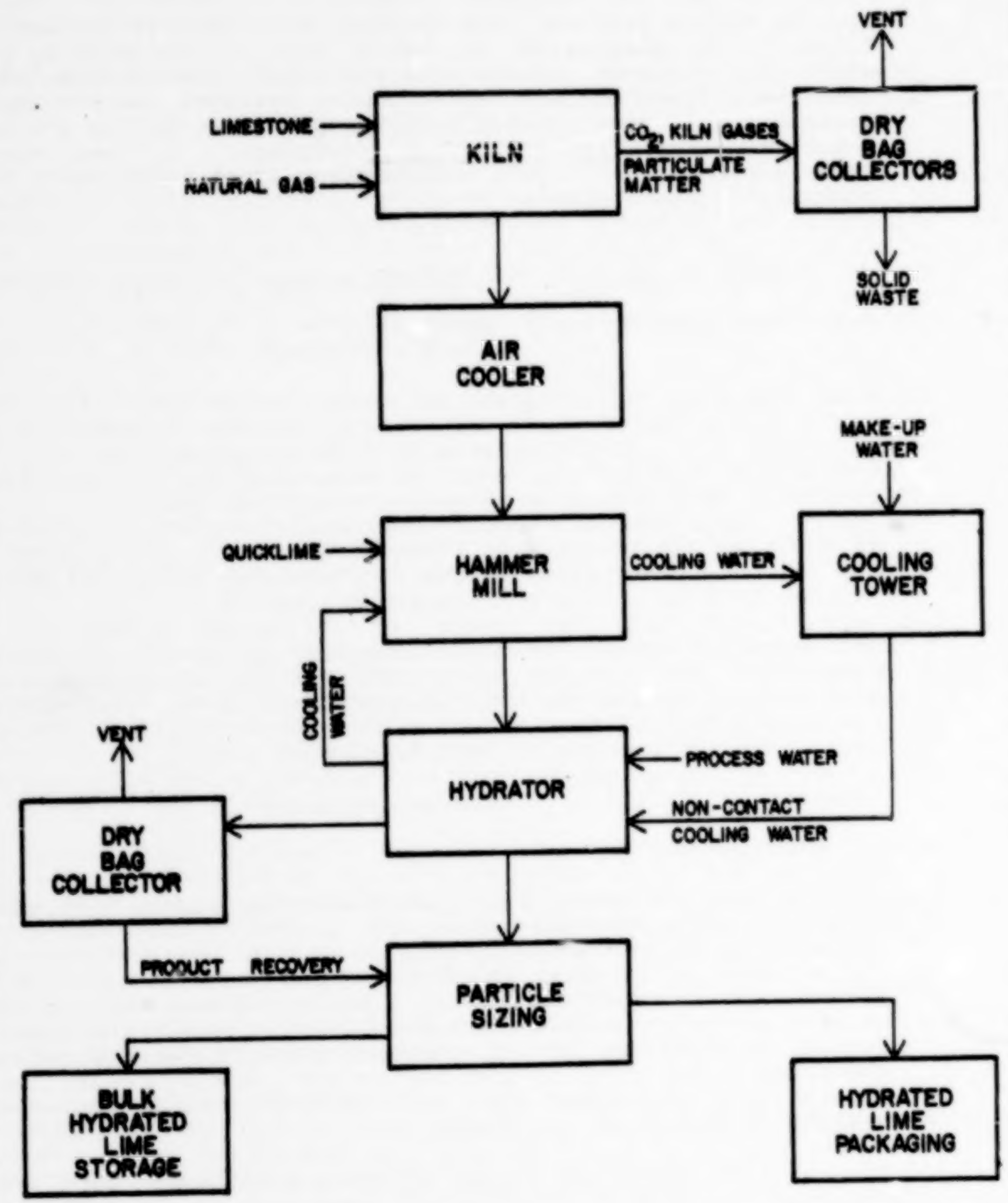

FIGURE 36
FLOW DIAGRAM FOR LIME PLANT 007

The raw wastes produced from calcium oxide manufacture are shown below. The quantities of waste are not affected by process startup or shutdown. These consist of fine dusts collected from the plant gas effluent by scrubbing systems. At the exemplary facility, this dust removal is achieved by use of bag filters and other dry particulate collection equipment. No wet scrubbing techniques are employed. Wet scrubbing of these dusts is used commonly at other plants.

Waste Product	Process Source	kg/kkg of Product (lb/ton)
Dry Particulate Matter	Kiln gases (Dry collector)	67 (133)

Exemplary plant water usage is described below. All cooling water is recycled and all product water is consumed in the manufacture of calcium hydroxide. Due to the use of dry waste collection techniques, there is no waterborne effluent from the facility. This plant achieves ninety-five percent or better solids collection at the kiln collector. Municipal water intake to the plant amounts to 638 l/kkg (153 gal/ton) of product plus the amount evaporated in the cooling tower. This water is not further treated in the plant prior to use.

This water represents the process water, which is used in the hydrator. The cooling water flow for the bearings on the tube mill and pistons on the hydrator pump amounts to 1000 l/kkg of product (240 gal/ton). It is completely recycled with makeup water added to compensate for evaporation.

Chlorine and Sodium or Potassium Hydroxide

a) Mercury cell process

Caustic and chlorine are produced from sodium chloride or potassium chloride raw materials in the mercury cell process, depending on whether caustic soda or caustic potash is to be produced. The raw material is dissolved and purified by addition of barium carbonate, soda ash, and lime to remove magnesium and calcium salts and sulfates prior to electrolysis. The insolubles formed on addition of the treatment chemicals are filtered from the brine. The brine is then fed to the mercury cell, wherein chlorine is liberated at one electrode and a sodium-mercury amalgam is formed at the other.

The chlorine formed is cooled, dried in a sulfuric acid stream, purified to remove chlorinated organics, compressed and sold. The mercury-sodium amalgam also formed during electrolysis is sent to a "denuder" where it is treated with water to decompose the amalgam. Sodium hydroxide and hydrogen are formed in the reaction. The mercury liberated is returned to the electrolysis

cells. The hydrogen is cooled, scrubbed to remove traces of mercury, compressed and sold.

The sodium hydroxide formed at the denuders is filtered, concentrated, and sold. Brines emerging from the electrolysis cells are concentrated and recycled.

Two exemplary facilities, plants 130 and 144, and one qualified exemplary facility, plant 098, have been selected and studied in detail. Plant 130 produces potassium hydroxide and plants 144 and 098 produce sodium hydroxide. Plant 098 is considered as an exemplary plant with the qualification that it is located outside of the United States. It is included because its mercury recovery system is of special note. The process flow diagram for plant 130 is shown in Figure 37.

Raw waste loads for this process are presented in Table 5, which gives overall figures based on twenty-one facilities, plus partial data as furnished from plants 098 and 130. The chief raw wastes include purification muds ($CaCO_3$, $Mg(OH)_2$ and $BaSO_4$) from brine purification, some spent brine materials from caustic recovery, and condensates from chlorine and hydrogen compressions. The sulfuric acid used to dry the chlorine is not a waste in plant 130 as it is recovered for sale.

In the caustic potash plant, plant 130, the brine muds and potassium chloride make up the bulk of the primary waste. A small amount of copper sulfate catalyst is also wasted. This catalyst is used in treatment of waste chlorine. Specifically, the chlorine is reacted with excess sodium hydroxide in the presence of copper sulfate to produce sodium chloride, water and oxygen. The sodium chloride so produced is sent to the waste treatment facilities.

At plant 144, the wastes emerging from chlor-alkali manufacture are sent to a series of two settling ponds, with the exception of those from the cell building, which are sent to a mercury treatment unit first. The wastes from chlorine drying, brine preparation, salt saturation and caustic loading are sent directly to the two settling ponds described above, where suspended solids are removed and the pH adjusted prior to discharge. Two emergency ponds are in parallel with these two ponds and wastes can be diverted to them for special treatment if needed.

Mercury-containing wastes from the cell building are first treated prior to being sent to the central waste treatment system. The effectiveness of treatment based on six months of data (129 days of measurements) is, in summary:

	Mercury Concentration to Secondary Treatment (mg/l)	Mercury Concentration after Treatment (mg/l)	Average Removal Efficiency (percent)
Average	44.3	0.43	99.0
Maximum values	1920.0	15.0	-
Minimum values	0.48	0.01	-

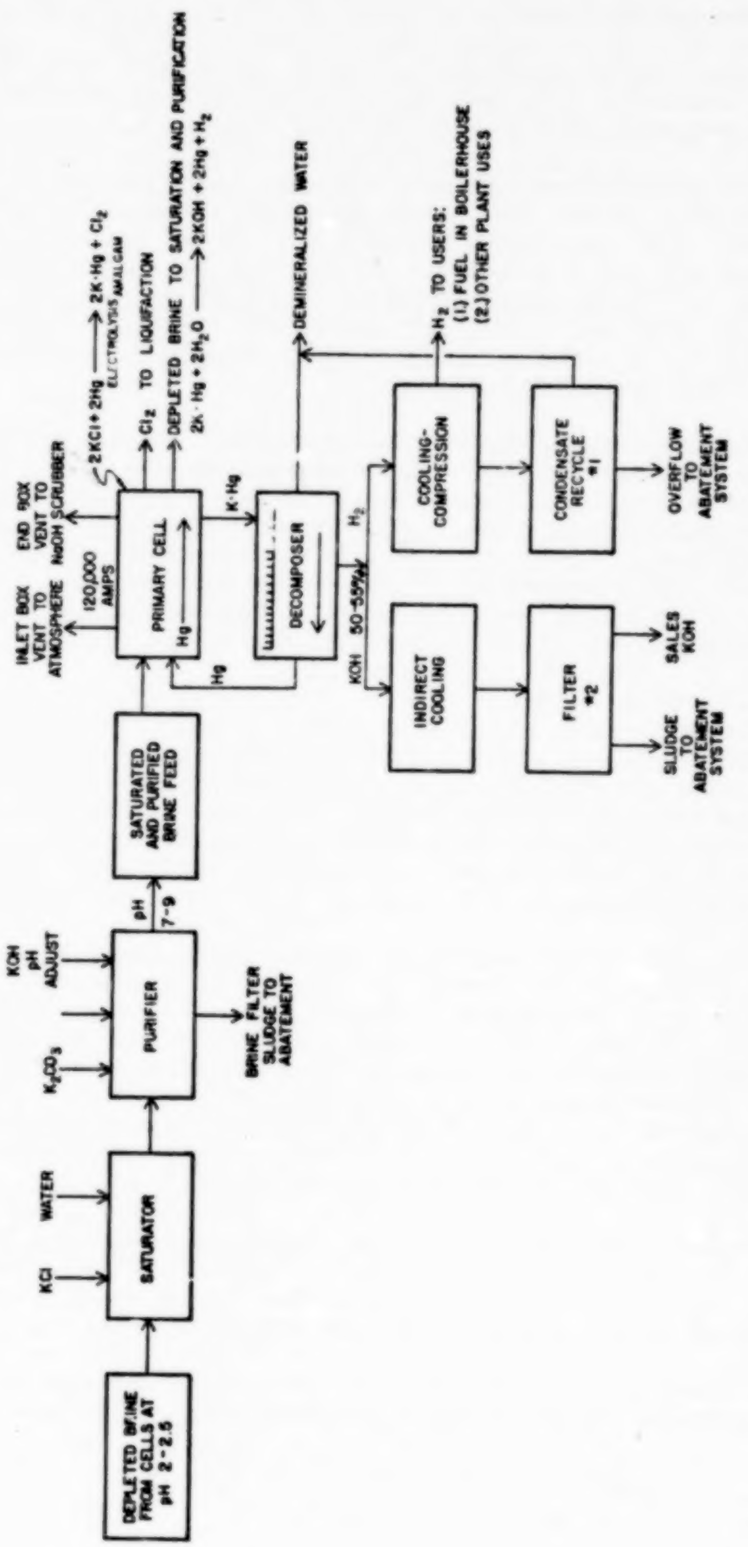

FIGURE 37
MERCURY CELL FLOW DIAGRAM (KOH) AT PLANT 130

TABLE 5. Raw Waste Loads from Mercury Cell Process
(All Amounts in kg/kkg of Chlorine)*

	Based on 21 Facilities		Plant 098	Plant 130	
	Mean	Range		Mean	Range
Purification muds, $CaCO_3$ & $Mg(OH)_2$	16.5	0.5-35	7.25	7.5	6.8-7.9
NaOH	13.5	0.5-32	-	-	-
NaCl	211	15-500	-	40	35-45
KCl	0	-	0	50	45-54
H_2SO_4	16	0-50	11.3	0	-
Chlorinated Hydro-carbons**	0.7	0-1.5	-	-	-
Na_2SO_4	15.5	0-63	-	-	-
Cl_2 (as $CaOCl_2$)	11	0-75	-	-	-
Filter aids	0.85	0-5	1.83	-	-
Mercury	0.15	0.02-0.28	0.0018	-	-
Carbon, graphite	20.3	0.35-340	-	-	-
$CuSO_4$	0	-	0	0.004	-

*can be converted to lb/ton of product by multiplication by 2.0.
**depends markedly on grade of chlorine produced.

Approximately 99 percent removal of mercury is achieved with the mercury losses from the facility being kept to about 0.0045-0.0237 kg/day (0.01-0.05 lb/day) for the most part. Figure 38 gives a histogram of the mercury discharges on a daily total quantity basis. The mean value of this discharge parameter is 0.0178 kg/day (0.03882 lb/day) or 0.000070 kg/kkg of chlorine (0.000140 lb/ton of chlorine). Ninety-one percent of the measurements fell below 0.00014 kg/kkg.

At plant 098, several of the streams are completely recycled to minimize brine wastes. Treatment of mercury-containing streams makes use of sodium sulfide to precipitate mercury and mercury sulfides. These materials are filtered from the streams, recovered as solids and treated with sodium hypochlorite to recover mercury (as chloride). The leached solids can then be safely discarded and the mercury chloride-containing solutions can be used for brine makeup and returned to the cells where the mercury chloride is decomposed to elemental mercury for reuse.

The mercury effluent and chlorine treatment effectiveness at plant 098 are as follows:

Method	Qualitative Rating*	Waste Reduction Accomplished
Mercury Recovery Unit	Excellent	97 percent recovery of mercury
Chlorine Neutralization System	Excellent	100 percent removal of chlorine from waste gas stream
Hydrogen Peroxide Treatment of liquid effluent	Good	100 percent removal of available chlorine

*As rated by plant personnel.

The mercury discharged and recovered from the sulfide treatment system over a two month period in 1972 from this plant averaged 0.0108 kg/day (0.0237 lb/day) or 0.000069 kg/kkg (0.000138 lb/ton) of chlorine. Analysis of the data for the two month period showed that the average mercury recovery was 258 kg/day (568 lb/day) or 7.5 kg/kkg (15.0 lb/ton) of chlorine. At the plant 130 mercury cell facility, brine filter sludges, potassium hydroxide recovery wastes and other waste streams are fed into a common treatment system, wherein the wastes are treated with sodium hydrosulfide and flocculants. The insoluble mercury products from treatment are removed by settling and filtration and the wastes are then discharged. The mercury content of the

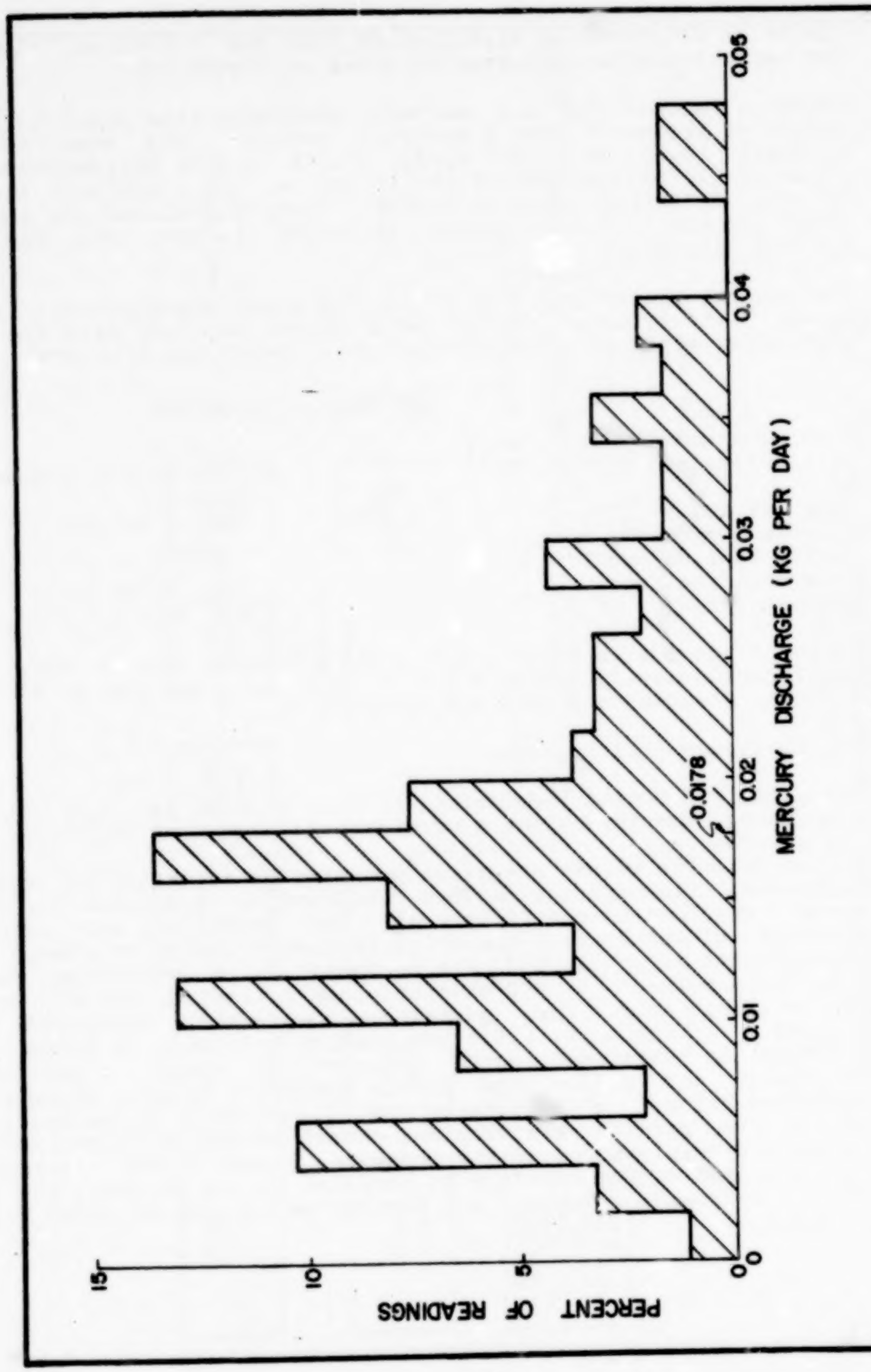

FIGURE 38
HISTOGRAM OF MERCURY DISCHARGES FROM PLANT 144

wastes is recovered by distillation from the recovered sludges. The mercury treatment system is shown in Figure 39.

Table 6 summarizes the mercury effluents from plant 130 as a result of treatment over a one-year period. The mean mercury effluent level of 0.0073 kg/day (0.016 lb/day) corresponds to a value of 0.000057 kg/kkg (0.000114 lb/ton) of chlorine, similar to the 0.000069 kg/kkg (0.000138 lb/ton) calculated for the 098 plant and the 0.000070 kg/kkg (0.000140 lb/ton) for the 144 mercury cell plant.

The general characteristics of the 098 plant discharge are listed below. The seawater cooling water stream is mixed with the process water effluent prior to discharge, hence the high TDS:

	Average	Range
Total Suspended Solids, mg/l	5	5-10
Total Dissolved Solids, mg/l	-	20,000-25,000 (seawater)
pH	7.1	6.7-8.5
Temperature, °C (°F)	12 (54)	10-19 (50-66)
Hydrogen Peroxide, mg/l	0	0-1.0
Sodium Sulfide, mg/l	0	0-0.5
Free Chlorine, mg/l		Max. 0.08
Mercury, mmg/l		Max. 8.0

Tables 7 and 8 give the plant 130 effluent stream data and verification data. Tables 9 and 10 give the plant 144 intake and effluent streams data with verification data.

b) Diaphragm cell process

The plant 057 facility described in this section is part of an integrated complex using a considerable amount of recycling and reuse technology.

Sodium chloride brines are first purified by addition of sodium carbonate, flocculating agents and sodium hydroxide in the amounts required to precipitate all the magnesium and calcium contents of the brine. The brine is then filtered to remove the precipitated materials and electrolyzed in a diaphragm cell. Chlorine, formed at one electrode is collected, cooled, dried with sulfuric acid, then purified, compressed, liquified and shipped. At the other electrode, sodium hydroxide is formed and hydrogen is liberated. The hydrogen is cooled, purified, compressed and sold. The sodium hydroxide formed, along with unreacted brine, is evaporated to 50 percent concentration. During the partial evaporation, most of the unreacted sodium chloride precipitates from the solution, which is then filtered. The collected sodium chloride is recycled to the process, and the sodium hydroxide solutions are further evaporated to yield solid products.

5671

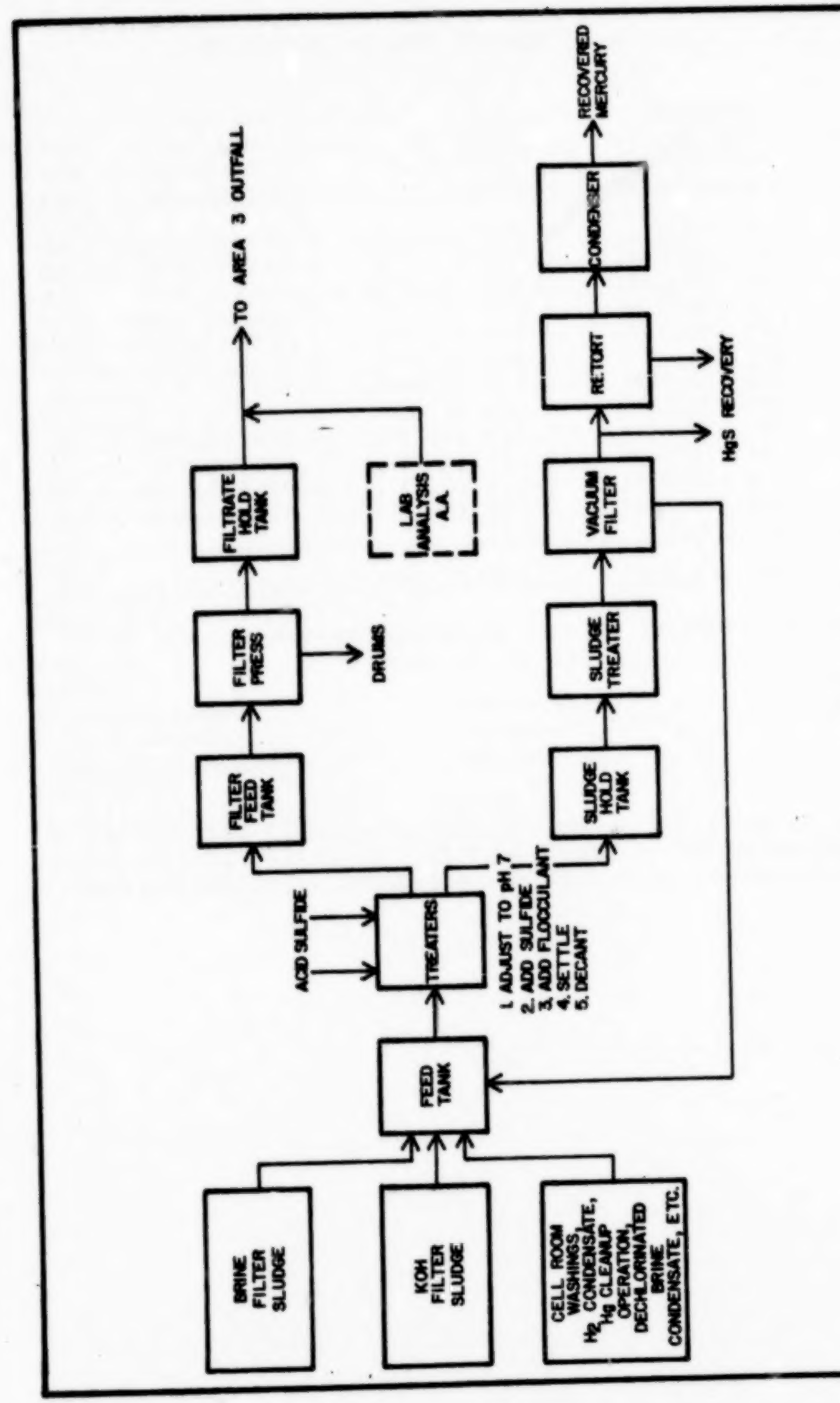

FIGURE 39
MERCURY ABATEMENT SYSTEM AT PLANT 130

5672

TABLE 6. Monthly Mercury Abatement System Discharge During 1972 at Plant 130

Month	Average Volume Discharge cu m(gal)/day	Total Hg Discharge kg (lb)	Average Daily Hg Discharge kg(lb)/day	Average mcg/l Hg
Jan	144 (37,916)	0.369 (0.813)	0.012 (0.026)	82
Feb	118 (31,030)	0.327 (0.719)	0.011 (0.024)	92
Mar	92 (24,195)	0.198 (0.435)	0.0064 (0.014)	69
Apr	112 (29,616)	0.184 (0.404)	0.0059 (0.013)	53
May	115 (30,339)	0.318 (0.700)	0.010 (0.023)	91
Jun	134 (35,277)	0.214 (0.471)	0.0068 (0.015)	51
Jul	124 (32,709)	0.225 (0.494)	0.0073 (0.016)	59
Aug	137 (36,169)	0.302 (0.665)	0.0096 (0.021)	72
Sep	131 (34,435)	0.127 (0.280)	0.0041 (0.009)	31
Oct	129 (34,024)	0.133 (0.293)	0.0041 (0.009)	33
Nov	126 (33,339)	0.176 (0.377)	0.0055 (0.012)	43
Dec	118 (31,135)	0.144 (0.251)	0.0036 (0.008)	31
Av.	123 (32,516)	0.224 (0.492)	0.0073 (0.016)	59

Statistical Summary: Mercury Abatement System Jan-Aug 1972 - Total of 244 Days

	Daily Mercury Discharge, kg (lb)/day	Daily Volume Discharge, cu m (gal)/day
Mean	0.0086 (0.019)	122 (32,164)
Range, Max.	0.0545 (0.120)	292 (63,945)
Standard Deviation	0.0077 (0.017)	40 (10,492)
90% of Values	0.0182 (0.040)	173 (45,594)

5673

TABLE 7. Plant 130 Effluent Data*

	Outfall #1	Outfall #2	Outfall #3**	Intake
Flow, cu m/day (MGD)	9,460 (2.5)	13,300 (3.5)	42,400 (11.2)	-
Total Suspended Solids	5	-	-	-
pH	8-11	8-9	8-9	-
Color (APHA Units)	-	-	-	5
Conductivity, umhos	-	-	-	287
Hardness, (Total) ($CaCO_3$)	-	-	400	134
Chloride	-	-	1252	22
Free Chlorine	-	-	0	0
Fluoride	-	-	1	1
Phosphates (as P)	-	-	-	0.1
Nitrate (as N)	-	-	1.92	1.92
Iron	-	-	1.2	1.0
Copper	-	-	-	0.01
Chromium	-	-	0.01	0.01
Manganese	-	-	-	
Vanadium	-	-	-	-
Arsenic	-	-	-	0.28
Mercury, mcg/l	-	-	1.2	1
Lead	-	-	0.1	0.1
Sulfate	-	-	39	18
Turbidity	-	-	-	16

*Data supplied by Plant 130, mg/l unless otherwise specified.
**Main outfall, outfalls 1 & 2 feed into 3. This waste stream contains potassium carbonate manufacturing effluent also.

5674

TABLE 8. Measurements of the Effluents From Plant 130

Parameter*	River (Intake)	Hg Cell Chlorine Liquefaction**	Abatement**	Major Outfall**
Flow, cu m/day (MGD)	Not Measured	8,540(2.25)	16,700(4.28)	42,000(11.1)
Temp., °C	2.0	11.95	10.1	8.5
Color, Apparent, APHA Units	60	60	180	150
Turbidity, FTU	23	19	55	50
Conductivity, mhos/cm	230	240	320	370
Suspended Solids,	70	210	75	210
pH	7.8	11.9	9.4	10.5
Alkalinity (Total)				
P ($CaCO_3$)	0	40	30	25
T ($CaCO_3$)	97	180	135	200
Hardness, (Total) ($CaCO_3$) mg/l	145	60	140	65
Calcium ($CaCO_3$)	115	25	110	35
Chlorine	0	0.2	0.3	0
Chloride	35	47.5	60	48.5
Fluoride	0	0	0	0
Sulfate	45	44	41	40
Phosphates (Total)	0.38	0.4	0.42	0.37
Nitrogen (Total)	1.55	0.45	0.13	0.38
Iron	0.19	0.5	0.7	0.4
Dissolved oxygen	***	8.3	7.6	8.5
Mercury, mcg/l	5	5	5	5

*mg/l unless otherwise specified.
**Corresponds to outfalls #1, 2 and 3 respectively on Table 21.
***Unable to determine at temperature below 5°C.

5675

TABLE 9. Plant 144 Intake Water

Parameter*		Plant Data**	GTC Measurement
Temperature, °C		8-24	19
Color, Apparent, APHA Units		-	175
Turbidity, FTU		-	50
Conductivity, mhos/cm		75	55
Suspended Solids		10	10
Dissolved Solids		65	-
pH		6.6	6.7
Acidity: Total		-	0 $CaCO_3$
Free		-	0 "
Alkalinity (Total)	P	-	0 "
	T	18	16 "
Hardness: Total		-	15 "
Calcium		-	5 "
Halogens: Chlorine		-	0.18
Chloride		-	15
Fluoride		-	0.1
Sulfate		-	8
Phosphates (Total)		-	0.34
Heavy Metals: Iron		-	0.48
Chromate (Cr+6)		-	0.02
Oxygen (Dissolved)		-	12
COD		15	10

*mg/l unless otherwise specified.
**Data from Corps of Engineers permit application, approximately two years prior to verification sampling.

5676

TABLE 10. Plant 144 Effluent Data

Parameter*	Plant Data**	Verification Measurement
Flow, cu m/day (MGD)	5,300 (1.9)	8,360 (3.0)
Temperature, °C	32-38	33
Color, Apparent, APHA Units	-	30
Turbidity, FTU	-	10
Conductivity, mhos/cm	1,525	2,000
Suspended Solids	0	0
Dissolved Solids	1,455	1,777
pH	7.0	7.5
Acidity: Total	-	0 $CaCO_3$
Free	-	0 "
Alkalinity (Total) P	-	0 "
T	60	14 "
Hardness: Total	-	20 "
Calcium	-	10 "
Halogens: Chlorine	-	0
Chloride	-	1020
Fluoride	-	0.5
Sulfate	-	107
Phosphates (Total)	-	0.18
Heavy Metals: Iron	-	0.42
Chromate (Cr+6)	-	0.02
Oxygen (Dissolved)	-	10
COD	8	5
Mercury, mcg/l	3	5

*mg/l unless otherwise specified.
**Data from Corps of Engineers permit application, approximately two years prior to verification sampling.

Figure 40 shows the flow diagram of a 1810 kkg/day (2000 ton/day) chlorine-caustic soda plant. A new 2080 kkg/day (2300 ton/day) chlorine-caustic soda plant also exists in this facility. The sodium hydroxide product from these two plants is concentrated in another portion of plant 057. This function is illustrated in Figure 41. All three of these facilities (all parts of plant 057) will be discussed below.

There are no brine wastes from plant 057 and several of the other waste streams are diverted for other uses in the complex. This stream diversion and maximal raw material utilization has served to minimize the wastes to be treated. The raw wastes from the newer plant are:

Waste Product	Process Source	Ave. kg/kkg (lb/ton) of Cl2
1. NaOCl	Gas Scrubber	1.13 (2.26) (Startup and shutdown)
2. $NaHCO_3$	Gas Scrubber	2.49 (4.58) (Wastes are ponded for recycle)
3. Chlorinated Organics	Liquefaction	0.35 (0.70)
4. Brine Sludge	Brine Treatment	10.5 (21)
5. Spent Sulfuric Acid	Chlorine Drying	1.0 (2.0)
6. Chromates	Cooling Tower	0.000363 (0.000726)
7. Suspended Solids	Cooling Tower	0.0333 (0.0666)

The raw wastes from the old plant are:

Waste Product	Process Source	Average kg/kkg of Chlorine (lb/ton)
1. Weak Caustic	Cells	66.25 (12.5)
2. Spent Sulfuric Acid	Chlorine Drying	4.05 (8.1)
3. NaOCl	Tail Gas Scrubber	7.50 (15.0)
4. Carbonate Sludge ($CaCO_3$)	Brine Treating	12.25 (24.5)
5. Chlorinated Hydrocarbons	Chlorine Purification	0.70 (1.4)

The raw wastes from the caustic plant are:

Waste Products	Process Source	Average kg/kkg of Product (lb/ton)
1. NaOH	Entrainment	4.4 (8.8)
2. NaCl	Entrainment	5.1 (10.2)
3. NaOH	Filter Wash	17.6 (35.2)
4. NaCl	Filter Wash	20.3 (40.6)

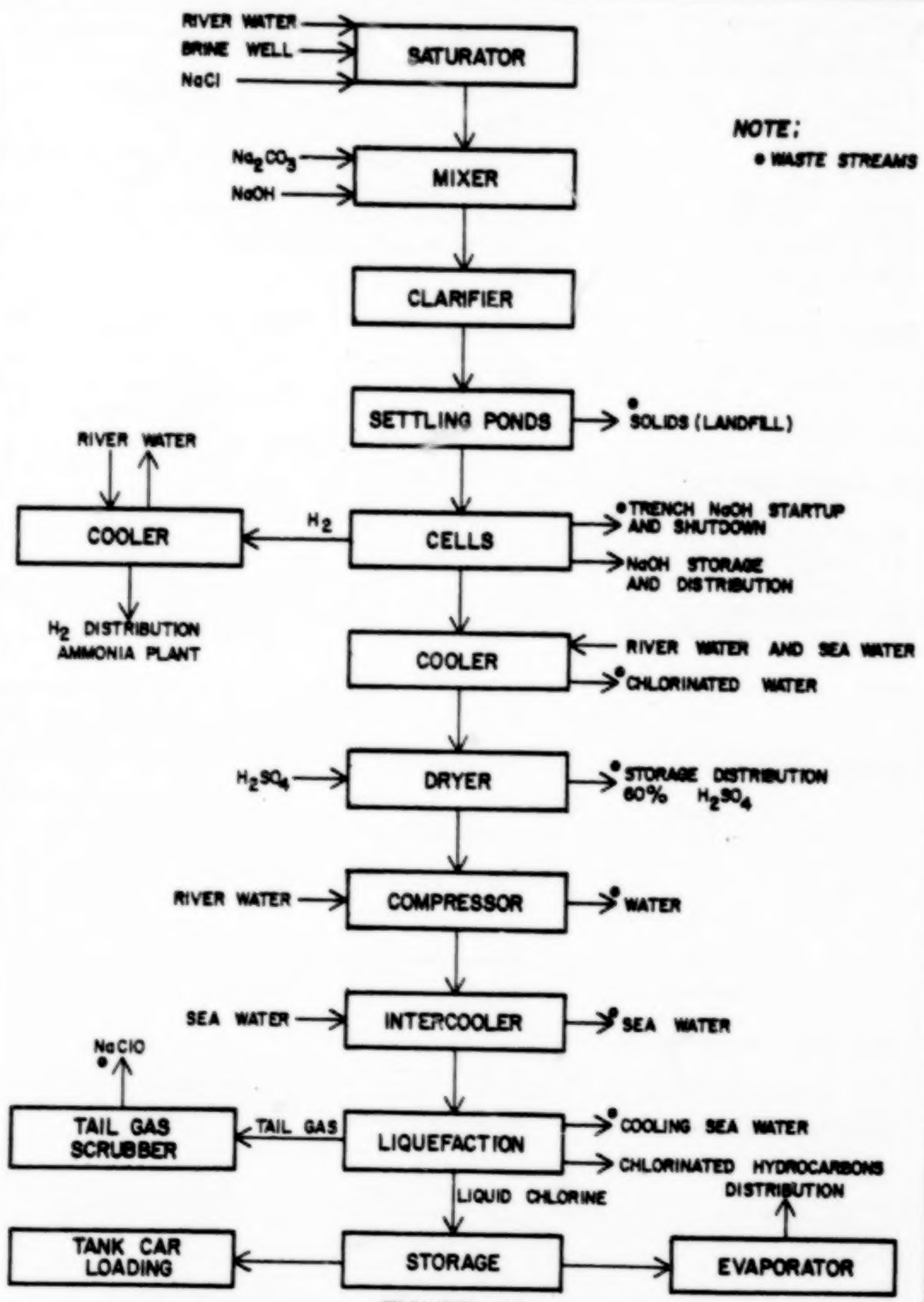

FIGURE 40
DIAPHRAGM CELL CHLOR-ALKALI PROCESS
AT PLANT 057

5679

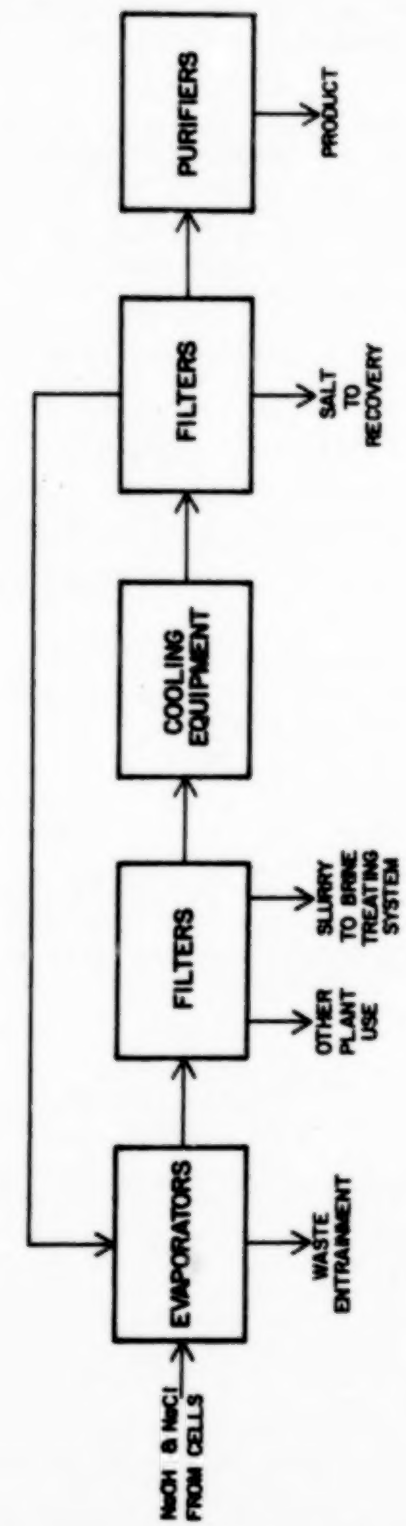

FIGURE 41
SODIUM HYDROXIDE CONCENTRATION FACILITY AT PLANT 057

5680

Many of the chlor-alkali waste streams, including brine wastes, are either recycled or put to use elsewhere in the complex. This section discusses treatment of those streams which are discharged.

The newer chlor-alkali plant takes in 2,720 cu m/day (0.72 mgd) of river water for cooling makeup and process water, as well as 54 cu m/day (0.0144 mgd) of well water for potable use. About 98.5 percent of the total cooling water flow of 109,000 cu m/day (28.8 mgd) is recycled, and 90 percent of the process water flow of 6040 cu m/day (1.6 mgd) is recycled. Of the potable water intake, 10 percent is recycled.

The waste treatment within this newer plant is:

Stream No./Source	Flow, l/day (gpd)	Treatment Method	Final Disposal
1/Gas Scrubber	409,000 (108,000)	Sunlight decomposition of NaOCl	To plant waste water system
2/Spent Sulfuric Acid	2,890 (765)	Other plant use	Used
3/Chlorine liquefaction	492 (130)	Incineration	---
4/Brine Treating	327,000 (86,400)	Solids to landfill	Brine recycled
5/Cooling Tower Blowdown	75,700 (20,000)	None	To plant waste water system

Waste chlorine in the tail gas is reduced by 80 percent in an absorption process, and the remaining chlorine is removed by scrubbing. These two processes are used in series to attain complete removal of chlorine from the tail gas.

Future treatment plans are:

Method	Estimated Installation Time	Estimated Performance
1. Chlorinated hydrocarbon waste burner	2 years	100 percent
2. Catalytic conversion of scrubber effluent to remove sodium hypochlorite	1 year	100 percent
3. Neutralization of scrubber effluent to remove sodium carbonate	1 year	100 percent

5681

At the older chlor-alkali facility in plant 057, river water intake is 10,450 cu m/day (2.76 mgd) and seawater intake is 57,200 cu m/day (15.14 mgd). The cooling water flow is 61,000 cu m/day (16.13 mgd), which is all non-contact except for the water chlorination step. Process water flow is 6.530 cu m/day (1.726 mgd), which is mainly as brine. Other process water uses are compression cooling, hydrogen cooling, chlorine cooling and absorption. There is less recycling of water here than in the newer plant. The effluent stream which is not recycled arises from the tail gas scrubber, which has a flow of 133,000 l/day (35,000 gal/day) or 141 l/kkg (37.2 gal/ton) based on chlorine product. This is disposed of completely in the plant waste system. It contains sodium hypochlorite. The disposal of this material will be eliminated and the tail gas will be used to manufacture hydrochloric acid product, thus eliminating a waste stream. When this happens, the older process should be close to a nondischarge system.

The water intake to the caustic plant is:

	cu m/day (mgd)
river water	1,890 (0.50)
seawater	90,900 (24.0)
well water	57 (0.015)

The river water is treated; the well water is not. The in-plant water flows are:

	cu m/day (mgd)	% Recycled
Forced Draft Cooling	6,540 (1.73)	95
Process	1,300 (0.344)	0
Washdowns	265 (0.070)	0
Entrainment Seawater	90,900 (24.0)	0

The only effluent to be treated is 4.4 kg/kkg (8.8 lb/ton) of sodium hydroxide and 5.1 kg/kkg (10.2 lb/ton) of sodium chloride in a 90,900 cu m/day seawater waste stream (the entrained system). This system is presently discharged without treatment. Future plans call for it to be neutralized prior to discharge. Chloride values entrained in this stream are considered to be too low to be worthwhile for other plant usage. These three facilities are being improved to further reduce discharges.

The effluents from the newer chlor-alkali facility, the older facility and the sodium hydroxide plant are shown below.

5682

Newer Plant:

Parameter	Stream No. 1	2	3	4	5
	Average Concentration, mg/l				
Total Dissolved Solids	18,330 (mostly chlorides)	-	-	1200	820
Total Suspended Solids	14	-	-	22,500	256
BOD	0	0	0	0	0
COD	0	0	0	0	0
pH	7.8	1	-	11.0	7.0
Temperature, °C	38	Ambient	31	Ambient	32
Chromate	-	-	-	-	10

Older Plant:

Dissolved Solids 103,090 (chlorides, hypochlorites)

Alkali Plant:

NaOH	25
NaCl	28.9 (added to seawater)

Hydrochloric Acid

Hydrochloric acid is manufactured principally by two processes: (1) As a by-product of organic chlorinations; and (2) By direct reaction of chlorine with hydrogen. Only production by direct reaction of chlorine is considered herein. In this process, hydrogen and chlorine are reacted in a vertical burner. The hydrogen chloride formed is condensed in an absorber from which it flows to a storage unit for collection and sale. The arrangement used at the exemplary facility (plant 121) is similar to the standard flow diagram shown in Section IV. The special waste treatment system used during startup of this facility startup is shown in Figure 42.

The raw waste loads from hydrochloric acid manufacture are presented below. Some of these are markedly dependent on conditions, with most of the wastes being produced during startups. There are no water-borne wastes during periods of normal operation.

Waste Products	Process Source	Amount of Product
1. Chlorine*	Burner Run - Chlorine-rich	Startup - 100 kg/kkg (200 lb/ton) avg. 5-200 range (10-400) Operation - 5 kg/kkg (10 lb/ton) avg. 0-10 range (0-20) Shutdown - no waste
2. HCl**	-	Startup - 4.5 kg/day (9 lb/ton) Operation - none Shutdown - none

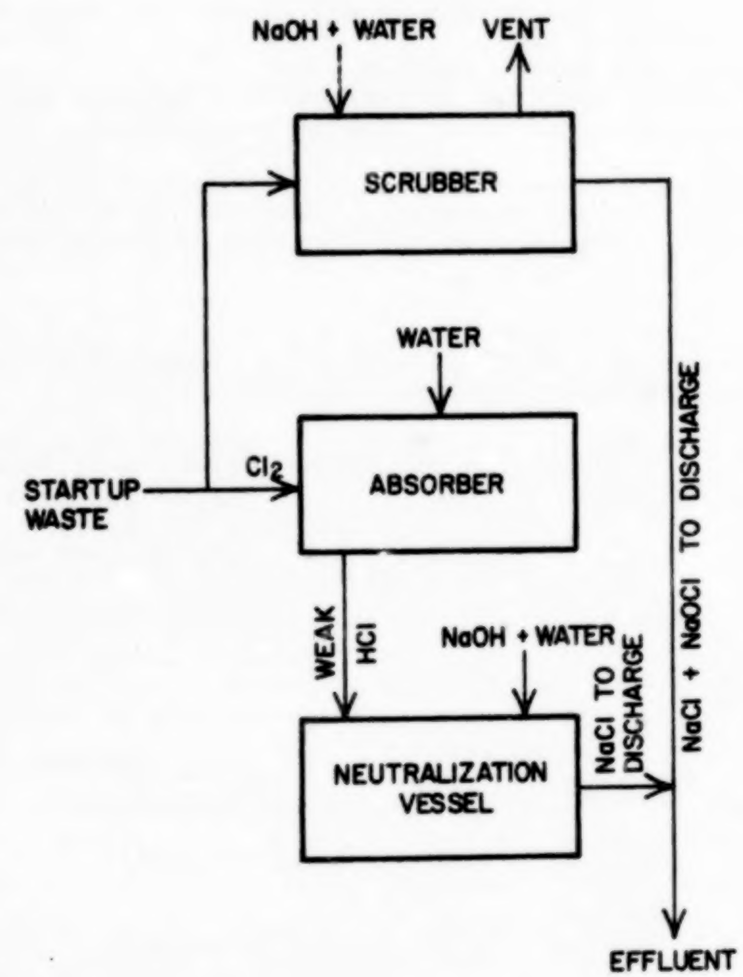

FIGURE 42
STARTUP WASTE TREATMENT SYSTEM AT PLANT 121

3. NaOH*** reaction products (NaCl and NaOCl)	Neutralization	Startup - depends on HCl and Cl_2 to be neutralized Operation - none Shutdown - none

*Emerges in vent gas during normal operation, neutralized during startup by NaOH.
**All neutralized during startup.
***Caustic (NaOH) used has 12 percent NaCl present and is cell liquor from chlorine plant also in the complex.

All waste water treatment is performed during startup of the facility. During normal operation, there are no water-borne wastes to be treated. Water use at the facility is listed below:

A. Input

Type	Quantity cu m/day	Quantity l/kkg	Comments on Content
Lake	5,680 (150,000 gpd)	15,650 (3,750 gal/ton)	TDS-300 mg/l, SS-10 mg/l, Cl-6[illegible] mg/l, SO4-34 mg/l, CaCO3-200 mg/l, Ca(HCO3)2-2-250 mg/l.
Well	1,135 (30,000 gpd)	3,130 (750 gal/ton)	Same as lake water except lower in sulfate, low SS (less than 10 mg/l).

B. Water Use

Type	Quantity cu m/day	Quantity l/kkg	Percent Recycled
Cooling*	1,135 (30,000 gpd)	3,130 (750 gal/ton)	0
Process	760 (20,000 gpd)	2,085 (500 gal/ton)	0 (Leaves as part of product)
Disposal from neutralization tank**	4,545 (120,000 gpd)	12,520 (300 gal/ton)	0
Miscellaneous	380 (10,000 gpd)	1,040 (250 gal/ton)	0

*Phosphate treatment used for this water. About 0.5 mg/l excess phosphate is employed.

**For safety purposes, continuous water flow is maintained into the neutralization tank even during normal process operation when no effluent or NaOH are introduced.

The effluents from the process streams before sewer at plant 121 are listed below.

Waste Stream	cu m/day	l/kkg
1. Neutralizing Reactor	4,355 (115,000 gpd)	12,000 (2,875 gal/ton)
2. Neutralizing Siphon Tank*	190 (5,000 gpd)	520 (125 gal/ton)
3. Test Sink and Washdown	380 (10,000 gpd)	1,040 (250 gal/ton)
4. Cooling Water	1,135 (30,000 gpd)	3,130 (750 gal/ton)

*Siphon Tank is 26,500 l and has less than 4 l/day drainage. It is operated batchwise with excess caustic always present. When the alkali content has been neutralized, it is disposed of.

After treatment, these streams are fed to a common equalization pond for pH adjustment and suspended solids removal prior to discharge. Effluent after this treatment (for the total complex) contains less than 10 mg/l of suspended solids and 2588 mg/l chlorides and sulfates, mostly from other processes.

The plant effluent characteristics are given below. There are no wastes during normal operation. All of the wastes arise from startup operations. In addition, there is an air-borne chlorine vent gas waste as noted earlier.

Parameter	Stream No. 1 Operation	Stream No. 1 Startup	Stream No. 2 Operation	Stream No. 2 Startup	Stream No. 3	Stream No. 4
Total Suspended Solids	10*mg/l	10 mg/l	No Effluent	Batch for a number of processes; 90-180 kg of Cl2 neutralized per month and disposed of in this stream		Same as lake water
Total Dissolved Solids	300*mg/l	40,000-50,000				
BOD	**	10 mg/l				
COD	**	**				
pH	6.5-10.0 9 avg.	6.5-10.0 9 avg.				

*Same as lake water
**Undetectable

All of the chlorine-burning HCl plants are located within chlor-alkali complexes. At present, there are four such facilities.

The 121 plant was sampled because of two considerations: 1) Unlike the other facilities, hydrochloric acid wastes are easily segregable. At other plants these wastes are mixed with chlor-alkali wastes before treatment; and 2) Unlike some other facilities, there are no hydrochloric acid wastes during normal operations.

This facility could be further improved by: (1) More efficient scrubbing of process tail gases to remove chlorine and use of the resulting chloride/hydrochloric solutions elsewhere in the facility; and (2) Reuse of the sodium chloride formed by acid neutralization.

Hydrofluoric Acid

Hydrofluoric acid is manufactured by reaction of sulfuric acid with fluorspar ore (mainly calcium fluoride). The reaction mixture is heated and the hydrofluoric acid leaves the furnace as a gas, which is cooled, condensed and sent to a purification unit. There the crude hydrofluoric acid is redistilled and either absorbed in water to yield aqueous hydrofluoric acid or compressed and bottled for sale as anhydrous hydrofluoric acid.

At an exemplary plant (plant 152), the calcium sulfate byproduct from the reactor is slurried with water and sent to waste treatment. Also, all tail gases are scrubbed and the scrubber water is sent to the waste abatement system. Figure 43 shows a detailed process diagram for the exemplary facility, and Figure 44 shows the waste water recycling system in use at this plant.

The waste products from hydrofluoric acid manufacture are shown below. Wastes consist of materials from the furnaces, which include calcium sulfate, calcium fluoride and sulfuric acid, plus fluoride-containing scrubber wastes.

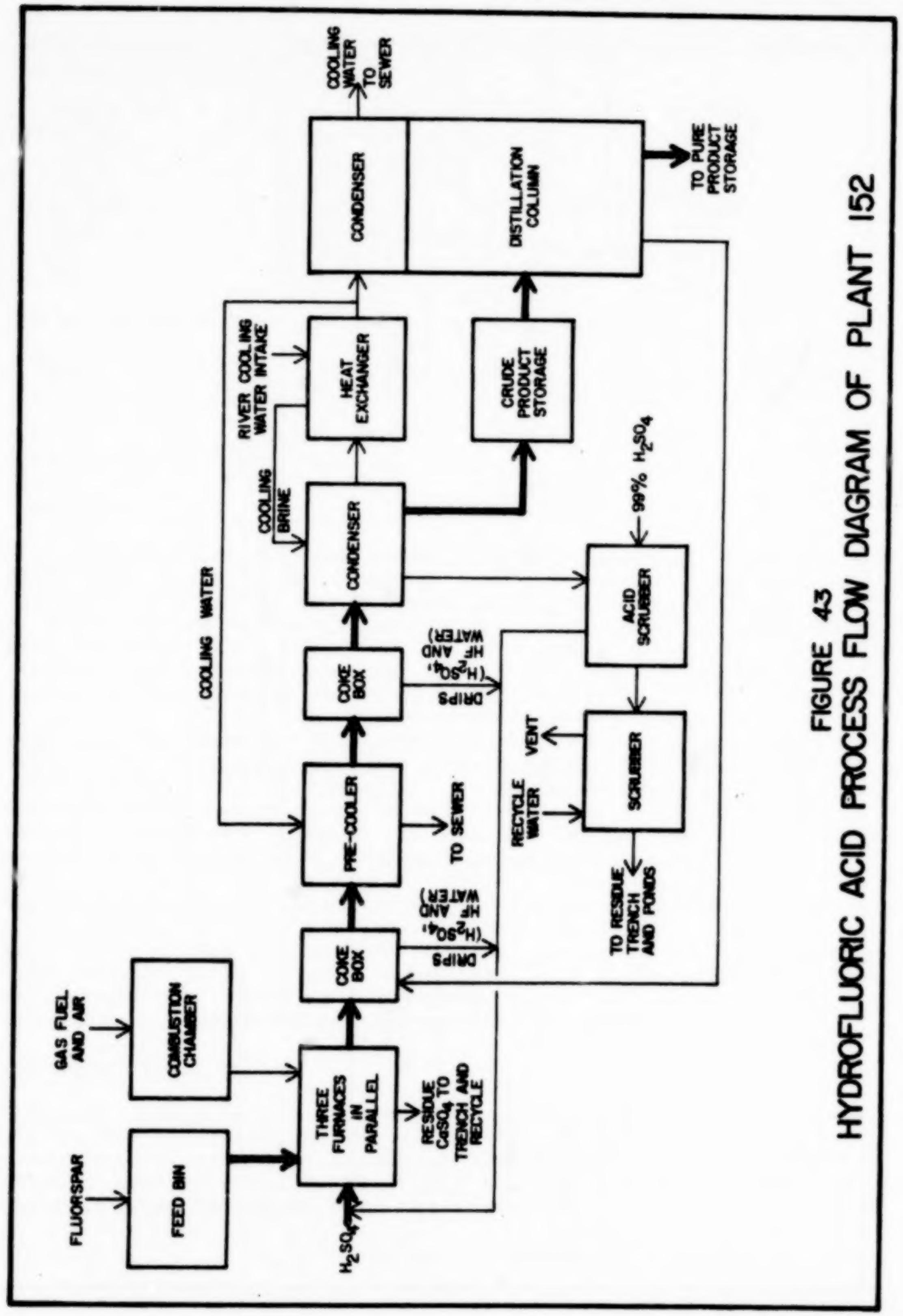

FIGURE 43
HYDROFLUORIC ACID PROCESS FLOW DIAGRAM OF PLANT 152

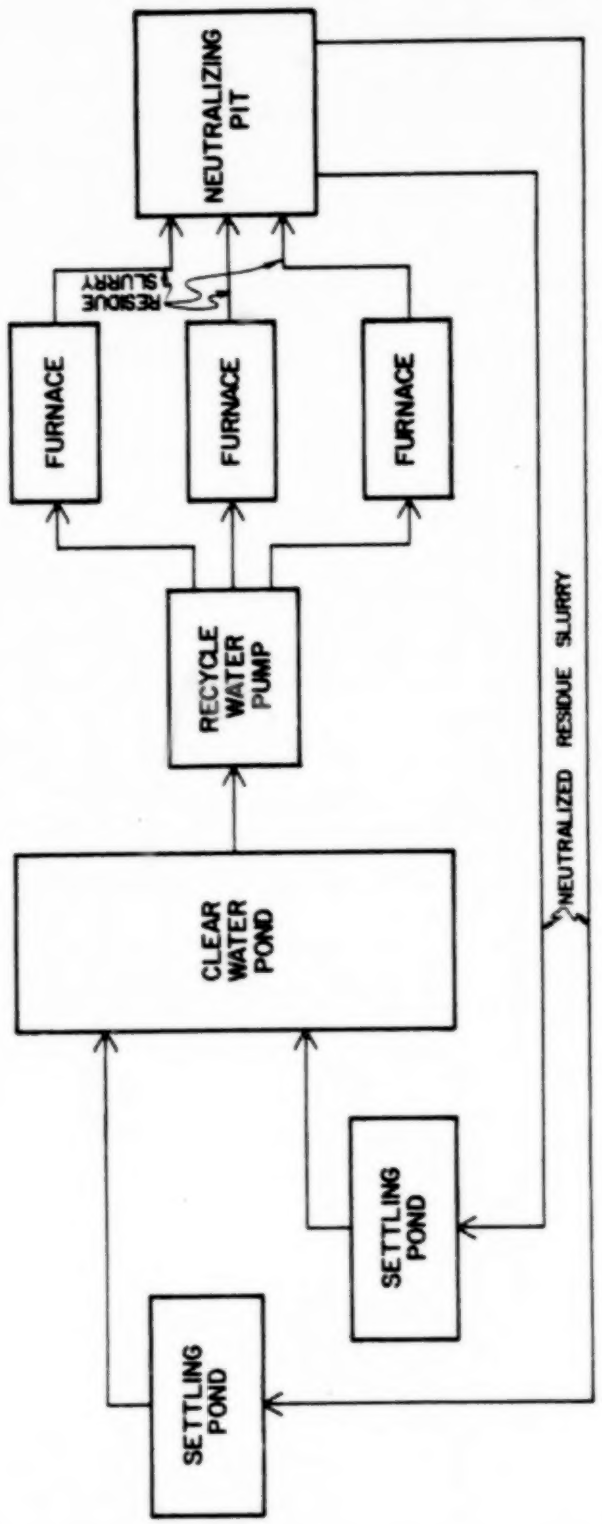

FIGURE 44
EFFLUENT RECYCLE SYSTEM AT PLANT 152

Waste Product	Process Source	Avg. kg/kkg (lb/ton) of Product
1. $CaSO_4$	Kiln (reactor)	3,620 (7,240)
2. H_2SO_4	Kiln (reactor)	110 (220)
3. CaF_2	Kiln (reactor)	63 (126)
4. HF	Kiln (reactor)	1.5 (3)
5. H_2SiF_6	Scrubber	12.5 (25)
6. SiO_2	Kiln (reactor)	12.5 (25)
7. SO_2	Scrubber	5 (10)
8. HF	Scrubber	1 (2)

The water use within plant 152 is shown below.

Type	Total Quantity		Recycled
	cu m/day(gpd)	l/kkg(gal/ton)	
Cooling (river water)	3,270(864,000)	90,140(21,600)	0 percent
Slurry and Scrubber	3,270(864,000)	90,140(21,600)	100 percent

All process and scrubber waste waters are recycled in the exemplary plant. The waters used to slurry and remove the calcium sulfate from the furnaces and scrubber waters are fed to a pond system after being treated with caustic or soda ash and lime to precipitate fluorides and adjust the pH. In the pond system, the insolubles are settled out and the waters are then reused in the process as shown in Figure 44.

Only cooling water is discharged from this facility. Table 11 shows the compositions of process waters before and after neutralization and of the river intake water which is essentially the same as the cooling water effluent. Low fluoride levels are easily maintained because of segregation of discharged cooling waters from the process water.

Verification measurements, shown for the plant intake water and the outflow of cooling water, are given in Table 12. The similarity of the intake and cooling water discharge verifies that there is no process water leakage into the cooling stream, and, therefore, there is no process water discharge from this exemplary hydrofluoric acid manufacturing plant.

Hydrogen Peroxide

Hydrogen peroxide is manufactured by three different processes: (1) An electrolytic process; (2) An organic process involving the oxidation and reduction of anthraquinone; and (3) A by-product of acetone manufacture from isopropyl alcohol. In this study, only the first two processes were considered.

TABLE 11. Intake Water and Raw Waste Composition Data at Plant 152*

Parameters		Units	Raw Waste Into Treatment	Recycle Water From Treatment	Intake River Water
Aluminum	Al	µg/l	7400	2200	2600
Beryllium	Be	"	66	64	20
Calcium	Ca	mg/l	640	450	12.2
Cadmium	Cd	µg/l	16	12	2
Cobalt	Co	"	300	280	26
Chromium	Cr	"	46	22	4
Copper	Cu	"	44	28	4
Iron	Fe	"	3100	780	1060
Magnesium	Mg	mg/l	6.0	6.4	3.2
Manganese	Mn	µg/l	100	106	68
Molybdenum	Mo	"	56	56	26
Nickel	Ni	"	80	68	4
Lead	Pb	"	1320	3400	820
Titanium	Ti	"	240	220	20
Zinc	Zn	"	1100	880	440
Barium	Ba	"	740	1020	1280
Potassium	K	mg/l	6.4	8.6	0.6
Sodium	Na	"	490	660	4.2
Tin	Sn	µg/l	140	140	24
Ammonia-Nitrogen		mg/l N	0.23	0.05	0.23
COD		" O_2	13.4	-	-
Fluoride		" F	13.0	12.5	0.2
Total Suspd Solids		"	16596	59	21
Total Solids		"	22015	3758	124
Total Vol. Solids		"	1220	340	58
Total Dissolved Solids		"	4250	3572	132
Nitrate		mg/l N	0.26	0.20	0.13
Nitrite		"	0.02	0.01	0.20
Nitrogen-Kjeldahl		"	0.57	0.46	0.46
Phosphate Total		mg/l P	1.60	0.96	0.02
Sulfate		mg/l S	880	767	7
Arsenic		µg/l	77	49	74
pH		-	3.86	7.22	7.17
TOC		mg/l	4	6	5

*Data furnished by manufacturer

TABLE 12. Comparison of Plant Intake Water and Cooling Water Discharge at Plant 152*

Parameter	Intake	Discharge	Units
Flow	Not Measured	3,270 (864,000)	cu m/day (GPD)
Temperature	Not Measured	18 (64)	°C (°F)
Color (Apparent)	50	50	Units APHA
Turbidity	19	19	FTU
Conductivity	65	65	mg/l NaCl
	135	135	micromhos/cm
Suspended Solids	7	12	mg/l
pH	7.40	7.50	-
Acidity: Total	0	0	mg/l $CaCO_3$
Acidity: Free	0	0	mg/l $CaCO_3$
Alkalinity (Total) P	0	0	mg/l $CaCO_3$
Alkalinity (Total) T	0	30	mg/l $CaCO_3$
Hardness: Total	50	50	mg/l $CaCO_3$
Halogens: Chlorine	0	0	mg/l Cl_2
Halogens: Fluoride	0.2	0.2	mg/l F^-
Sulfate	25	22	mg/l SO_4^{-2}
Nitrogen (Total)	0.20	0.14	mg/l N
Heavy Metals:			
Iron	0.25	0.25	mg/l Fe
Chromate (Cr+6)	0.02	0.02	mg/l Cr^{+6}
Oxygen (Dissolved)	11	10.4	mg/l O_2
COD	25	0	mg/l

*Data from verification sampling

a) Organic process

In the organic process, anthraquinone (or an alkylanthraquinone) in an organic solvent is catalytically hydrogenated to yield a hydroanthraquinone. This material is then oxidized with oxygen or air back to anthraquinone, with hydrogen peroxide being produced as a by-product. The peroxide is water-extracted from the reaction medium, and the organic solvent and anthraquinone are recycled. The recovered peroxide is then purified and shipped. Figure 45 shows a specific flowsheet for plant 069, including part of the waste abatement program.

Waste Products	Process Source	Operation Avg. Range kg/kkg (lb/ton)
Sulfuric Acid	Ion Exchange Units	12.5-15 (25-30)
Trace Organics	Contact Cooling	0.17-0.35 (0.34-0.70)
Hydrogen Peroxide	Purification Washings	20-25 (40-50)

The process runs continuously, except for shut-down approximately 10 days/year. Total discharge will normally be no higher during start-up and shut-down periods than under operation at capacity.

Well water at 312 cu m/kkg of product (74,500 gal/ton) having the following composition in the water input at plant 069.

Total Solids	110-125 mg/l
Carbon Dioxide	30-60 mg/l
Total Hardness	80-100 mg/l
Fe	1-3 mg/l
Cu	0.03-0.06 mg/l
Zn	0.02 mg/l
Sulfate	2-7 mg/l
Alkalinity ($CaCO_3$)	70-110 mg/l

Water Usage

Type	cu m/kkg (gal/ton)	% Recycled
Cooling	365 (87,200)	25 percent recycled 35 percent of remainder used twice
Process	16 (3,800)	----

Most of the water is used for cooling, and a relatively large fraction of this water is recycled.

The data below describes the treatment of the waste stream emerging from the peroxide plant. Peroxide is decomposed by iron filings, and organic solvent losses are minimized by a skimming operation:

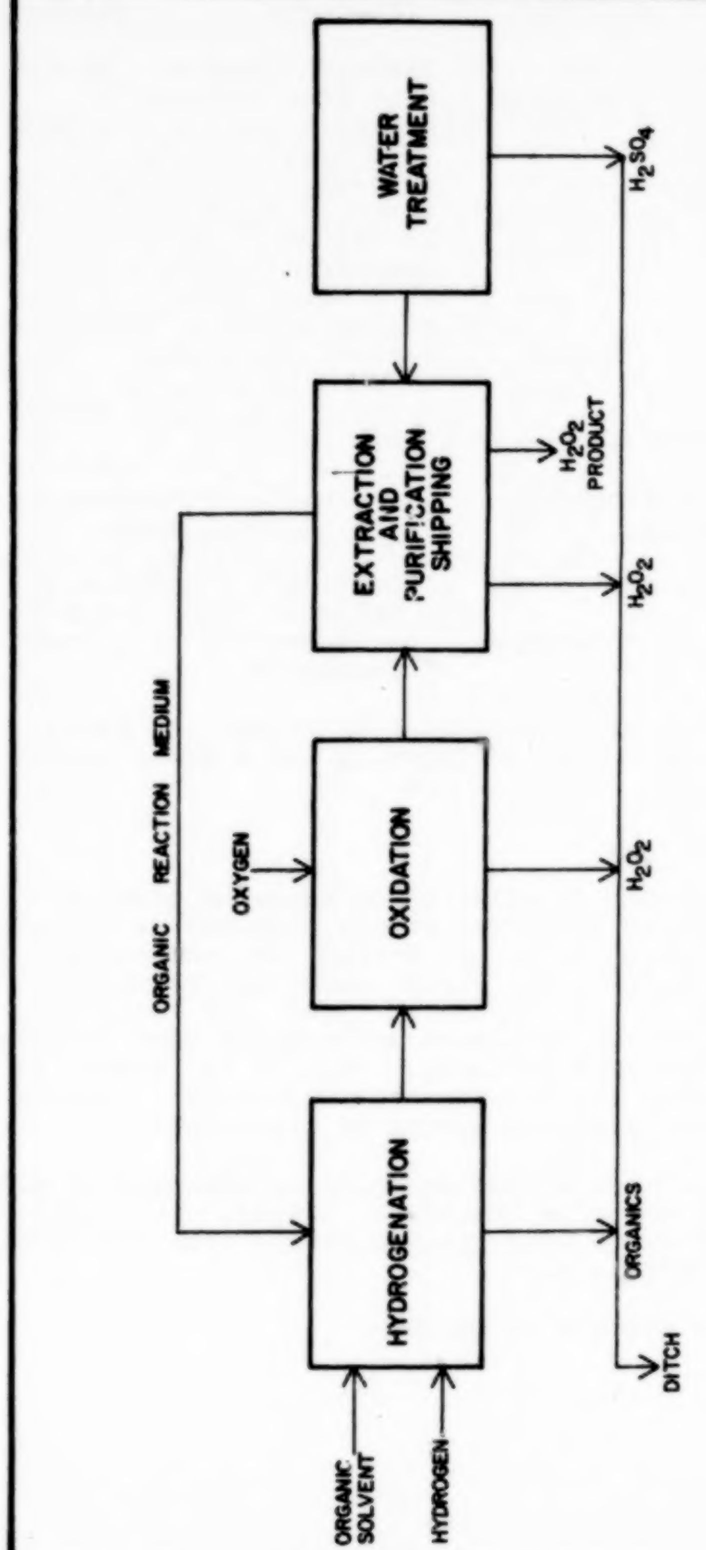

FIGURE 45
HYDROGEN PEROXIDE PROCESS DIAGRAM FOR PLANT 069

Waste Stream	Source	cu m/kkg (gal/ton)	Treatment	Final Disposal
Process Effluent	Process	294 (70,200)	1. Peroxide reacted with iron filings 2. Skimmers used to trap organics for recovery 3. Waste sulfuric acid is collected and discharged at a controlled rate 4. Solids (alumina & carbon) are hauled to landfill	River

The effectiveness of the treatments in use is:

Method	Qualitative Rating	Waste Reduction Accomplished
Reduction	Generally satisfactory	80 percent reduction of peroxide to water and oxygen
Skimming	Generally satisfactory	60-70 percent of organics recovered

The effluent composition after treatment is given in Table 13. The wastes consist of unreacted peroxide and a small amount of organics and sulfates.

b) Electrolytic process

In the electrolytic process, a solution of ammonium bisulfate is electrolyzed. Hydrogen is liberated at the cathodes of the cells used, and ammonium persulfate is formed at the anode. The persulfate is then hydrolyzed to yield ammonium bisulfate and hydrogen peroxide which is separated from the solution by fractionation. The ammonium bisulfate solution is then recycled, and the peroxide is recovered for sale. The only waste is a stream of condensate from the fractionation condenser. Figure 46 shows the process waste treatment system at plant 100.

Table 14 lists the raw wastes from peroxide manufacture at plant 100. These consist of ammonium bisulfate losses, ion exchange losses, boiler blowdowns and some cyanide wastes from the special batteries used in electrolysis.

Plant water intake and use are as follows:

TABLE 13. Plant 069 Process Water Effluent After Treatment

Parameter*	Plant Data Average	Plant Data Range	Verification Sample: Verification Measurement	Verification Sample: Plant 069 Measurement
Total Suspended Solids	-	15-20	9	9
Total Dissolved Solids	-	310-330	98	117
BOD	-	6-7	-	-
COD	40	-	50	33
pH	-	6-9	6.4	6.6
Temperature	30°C	-	27°C	-
T.O.C.	-	5-15	-	-
Hydrogen Peroxide	-	60-80	-	37.8
Turbidity (Jackson Units)	25	-	12	25
Color (APHA Units)	-	20-20	50	10
Acidity (Free)	-	40-50	-	46
Acidity (Total)	0	-	-	-
Alkalinity (Total)	-	150-195	61	-
Hardness (Total)		90-105	92	-
Chloride	2	-	5	7
Sulfate	-	40-75	43	52
Iron	-	2-3.5	1.6	0.26
Copper	-	0.08-0.09	-	-
Flow	25,000 cu m/day (6.6 MGD)	-	26,000 cu m/day (7.1 MGD)	-

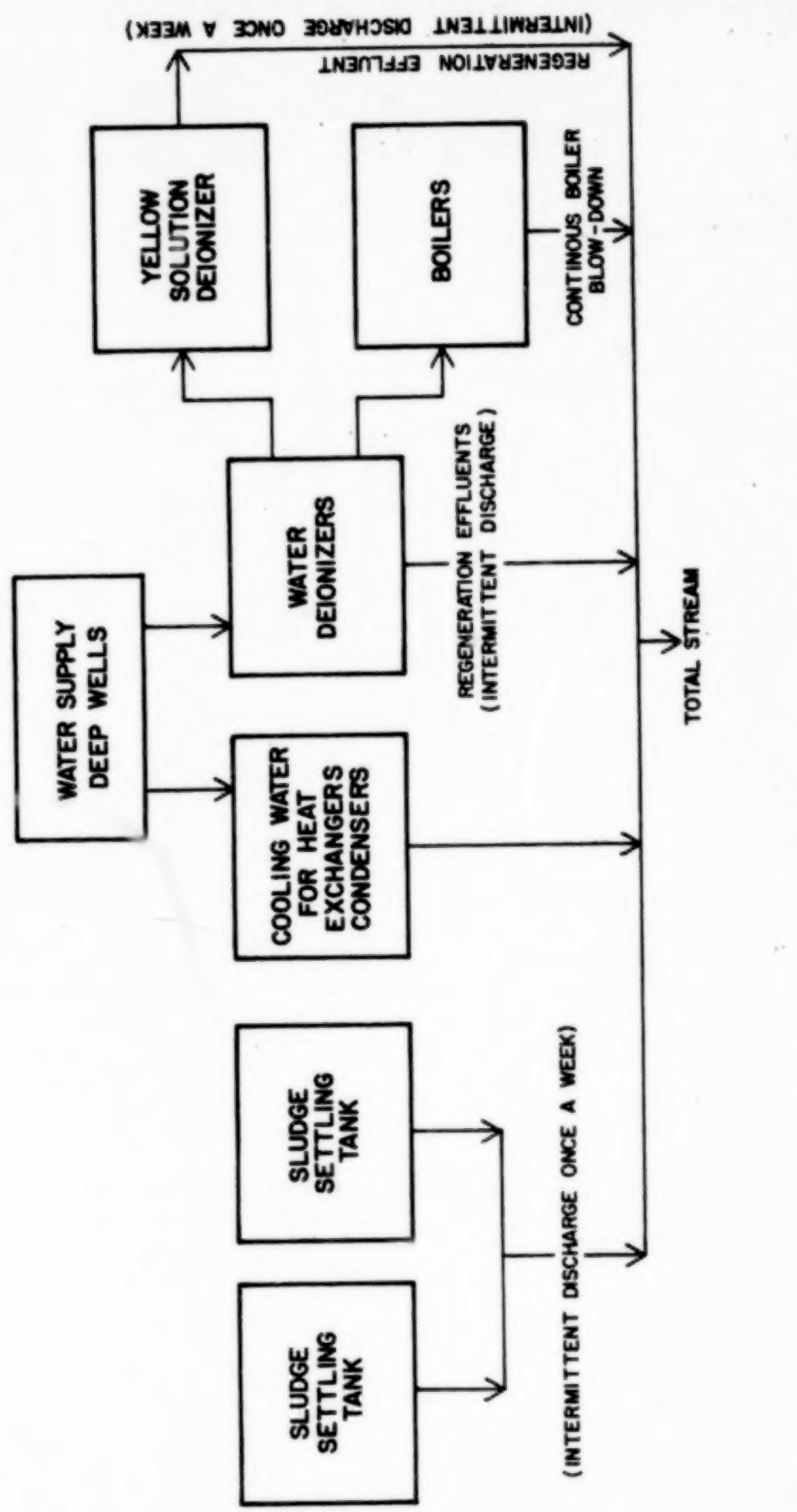

FIGURE 46
SCHEMATIC SHOWING WASTE SOURCES AND DISCHARGE AT PLANT 100

TABLE 14. Raw Waste Loads at Plant 100

Waste Product	Process Source	kg/kkg of Peroxide (lb/ton) Operation	Startup Shutdown
1. Blue prussiate sludge	Purif.	0.18(0.36)	No significant difference during startup & shutdown periods. Plant runs continuously; shuts down once per year.
2. Gray sludge	Battery rebuild	(5 times per year)	
3. Ion Exchange sludge	Deionizer regen.	---	
4. H_2SO_4	Plant solution loss	0.0018(0.0036)	
5. $(NH_4)_2SO_4$	Plant solution loss	0.012(0.024)	
6. Water flow	Cooling	2000-2900 (4000-58000)	
7. HCl	Deionizer regen.	1.3(2.6)	
8. NaOH	Deionizer regen.	0.33(0.66)	
9. Steam condensate	Boiler blowdown	581(1162)	

Comments: H_2SO_4 and $(NH_4)_2SO_4$ are used to replenish plant solution. $Na_4Fe(CN)_6$ is converted to $(NH_4)_4Fe(CN)_6$ through ion exchange (yellow solution).
NH_4SCN is oxidized in the batteries and is used for better current efficiency.
HCl and NaOH are used for regeneration of demineralized water ion exchange resins.

Water	Flow, cu m/day (mgd)	Amount, l/kkg (gal/ton)	Use
Municipal	7.2 (0.0019)	601 (114)	Drinking, Washing, Sanitary
Well	41,600 (11.0)	3,480,000	76 cu m/day (0.002 mgd) demineralized for process water, rest used as cooling

Of the 76 cu m/day of process water, 31 percent is used in the product. Recycle flow of process water is 132 cu m/day and recycle flow of steam is 305 cu m/day (liquid basis). About 26.5 cu m/day is boiler blowdown. None of the cooling water is recycled. Table 15 lists the various plant effluent streams, their sources, flows and treatments. Treatments consist of ion exchange for pH control and recovery of some process materials, and recovery of platinum in the waste streams. After this, wastes are discharged.

Performance information on the pH control and ion exchange technology used for waste abatement in this plant is:

Method	Qualitative Rating	Waste Reduction Accomplished
1. pH Control	Good	99+ percent
2. Process change	Excellent	CN- load reduced 98 percent - Additional concentration to discharge stream less than 0.01 mg/l
3. Monitoring	Good	Reduces unknown discharges and allows quick operation response.

Table 16 lists the compositions of the various effluent streams after treatment. These streams are mixed prior to discharge. Table 17 shows an analysis of the intake water and final effluent after mixing. Only very small amounts of materials are introduced into the waters used, and cyanides in the effluent are negligible.

Nitric Acid

Nitric acid is manufactured from ammonia by a catalytic oxidation process. Ammonia is first catalytically oxidized to nitric oxide, which is then further oxidized to nitrogen dioxide. The nitrogen dioxide is then reacted with water under pressure to yield nitric acid. Plant 114 manufactures only commercial 63

5699

TABLE 15. Effluent Treatment Data for Plant 100

A. Water Streams

Stream No.	Source	l/day (MGD)	l/kkg (gal/ton)
1. Low Exchange Regenerant	Demineralizer	3,790(1,000)	317(76)
2. Blue Prussiate Supernatant (filter backwash)	Filters	568(150)*	47.6(11.4)
3. Yellow Solution	Ion Exchange	568(150)*	47.6(11.4)
4. Boiler Blowdown	Boilers	26,500(7,000)	2,210(530)

B. Treatments

Stream No. (same as above)	Treatment Method	Final Disposal System
1	Anion and cation regenerants are mixed to control pH and slowly released.	Plant effluent
2	Settled for platinum recovery, siphoned and filtered**.	Plant effluent
3	Backwash recycled to process and regenerant is discharged.	Plant effluent
4	Dilution	Plant effluent

*These operations are batch carried out an average of once per week.

**Sludges recovered here are sent to refiners for recovery of platinum values.

5700

TABLE 16. Composition of Plant 100 Effluent Streams After Treatment*

Constituents	No. 1 Stream	No. 2 Stream	No. 3 Stream	No. 4 Stream
Total Suspended Solids	1856 as $CaCO_3$ equiv. during regeneration	--	0	--
Total Dissolved Solids	Comparable to raw water	200-400	40,000	1,000
BOD	Same as raw water	--	--	--
COD	Same as raw water	--	--	--
pH	6.5-8.5	4	7	8
Temperature, °C	17	18	18	--
Conductivity micromhos/cm	7160	--	--	--
Alkalinity	--	--	--	400
Free Cyanide	--	<2	<2	0
Phosphate	--	--	--	30
Chloride	--	--	--	20-30 (as NaCl)

*all units mg/l unless otherwise specified.

5701

TABLE 17. Plant 100 Water Intake and Final Effluent Verification Measurements

Parameter*	Well Water	Outfall
Conductivity,	120 (as NaCl)	120 (as NaCl)
micromhos/cm	240	--
Color	0	0
Turbidity	0	0
SS	0	0
pH	6.88	7.04
Sulphate	18	21
Nitrate	3.3	2.3
Phosphate	0.35	0.36
Iron	0.02	0.01
Chloride	6.5	7.5
Hardness (Ca)	65	70
Total Hardness	95	90

*mg/l unless otherwise specified.

5702

percent nitric acid. Fuming (i.e., more than 70 percent) nitric acid and nitrogen pentoxide are made only at a few facilities and are not covered in this report. The flow diagram for plant 114 is given in Figure 47.

The raw waste load from nitric acid production at Plant 114 is listed below. The waste values are not affected by startup or shutdown. There are no nitrates in the waste. All weak nitric acid lost in the manufacturing process is recycled to the process at this facility. The wastes consist only of water treatment chemicals used for the cooling water.

Waste Products	Process Source	Avg. kg/kkg HNO_3 (lb/ton)
1. Lime	Boiler Feedwater	0.47 (0.94)
2. Calcium and Magnesium Carbonates	Boiler Feedwater	0.6 (1.2)
3. Disodium Phosphate	Boiler	0.0016 (0.0032)
4. Sodium Sulfate	Boiler	0.0008 (0.0016)
5. Sulfuric Acid	Cooling Tower	0.0016 (0.0032)
6. Chlorine	Cooling Water Treatment	1.0 (2.0)

Plant water use is shown below and describes the large amount of water and weak acid recycling at the plant. Only cooling water is discharged, and this waste stream is currently untreated.

A. Water Inputs

Types	Quantity cu m/day	Quantity l/kkg
Well	3,815 (1,008,000 gpd)	13,150 (3,150 gal/ton)

B. Water Use

	Quantity cu m/day	Quantity l/kkg	Recycled
Cooling	31,000 (8,000,000 gpd)	106,800 (25,000 gal/ton)	95
Process stream	775 (200,000 gpd)	2,670 (6,250 gal/ton)	100

The plant effluent streams are shown below. Wastes discharged are only water treatment chemicals.

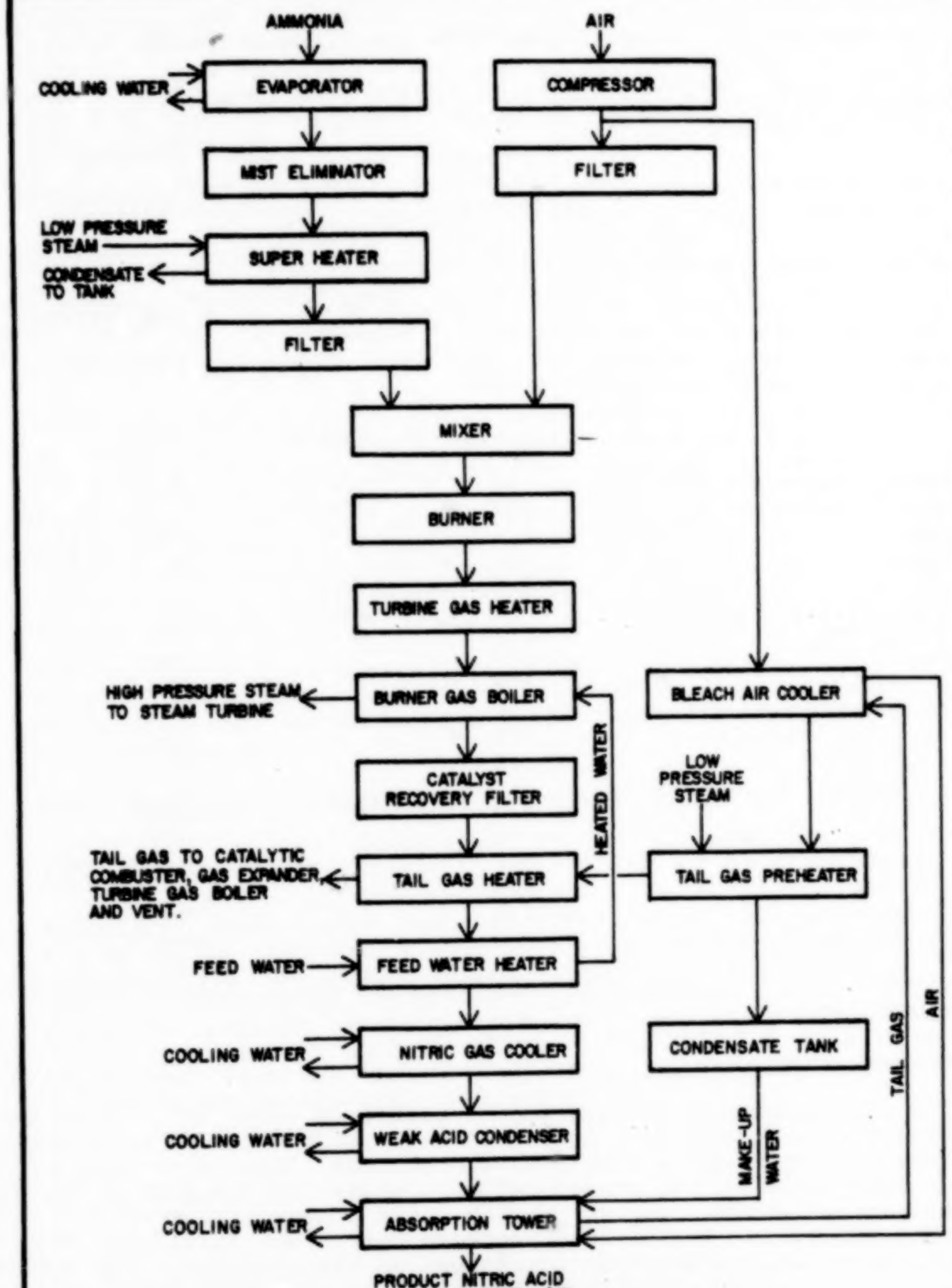

FIGURE 47
NITRIC ACID PROCESS FLOW DIAGRAM FOR PLANT 114

Sources	cu m/day	l/kkg
Boiler Feedwater Treatment	5 (1,250 gpd)	16 (3.9 gal/ton)
Boiler Blowdowns	30 (7,800 gpd)	85 (24.4 gal/ton)
Cooling Water Blowdowns	3600 (95,000 gpd)	1240 (297.0 gal/ton)

(All streams tie into common effluent header before discharge)

Because of recycling of some water and of all nitrogen-containing streams, this plant is exemplary. However, as in many other cases, cooling waters are untreated prior to discharge. The plant effluents are listed below.

	Average	Range	Units
Total Suspended Solids	80	50-100	mg/l
Total Dissolved Solids	239	200-250	mg/l
BOD	5	-	mg/l (O2)
COD	10	-	mg/l (O2)
pH	7.8	7.5-8.5	-
Temperature	25	24-27	°C
Turbidity	125	-	JTU
Color	330	-	PTCO
Conductivity	500	-	mhos
Alkalinity (Total)	300	-	mg/l
Hardness (Total)	300	-	mg/l
Chloride	18	-	mg/l
Fluoride	0.2	-	mg/l
Sulfite	0.2	-	mg/l
Sulfate	60	-	mg/l
Phosphates	0.4	-	mg/l
Nitrate	0.2	-	mg/l
Iron	7.5	-	mg/l
Manganese	0.2	-	mg/l

A plant visit verified that only cooling water is discharged from plant 114.

Potassium Metal

For the commercial preparation of potassium metal (K), potassium chloride is melted in a gas-fired melt pot and fed to an exchange column. The molten potassium chloride flows down over steel Raschig rings in the packed column, where it is contacted by ascending sodium vapors coming from a gas-fired reboiler. An equilibrium is established between the two, yielding sodium chloride and elemental potassium as the products. The sodium chloride formed is continuously withdrawn at the base of the apparatus and is normally sold. The column operating conditions may be varied to yield either pure potassium metal as an overhead product or to vaporize sodium along with the potassium to produce sodium potassium (NaK) alloys of varying compositions. Potassium metal of over 99.5 percent purity can be continuously produced by this process.

Production of potassium in the United States was about 90 kkg (100 ton) in 1972, essentially all of it originating from one facility - plant 045. Contacts with this manufacturer have revealed that the process diagram accurately describes their process. No process water is used and there are no waterborne effluents.

Potassium Dichromate

Potassium dichromate is prepared by reaction of potassium chloride with sodium dichromate. Potassium chloride is added to the dichromate solution, which is then pH-adjusted, saturated, filtered and vacuum cooled to precipitate crystalline potassium dichromate. The product is recovered by centrifugation, dried, sized and packaged. The mother liquor from the product centrifuge is then concentrated to precipitate sodium chloride which is removed as a solid waste from a salt centrifuge. The process liquid is recycled back to the initial reaction tank.

The raw wastes from potassium dichromate manufacture are listed below. These are crystalline sodium chloride and filter aids which are solid wastes and are hauled away for landfill disposal by a contractor.

Waste Products	Process Source	kg/kkg of Product (lb/ton)
NaCl	Centrifuge	400 (800)
Filter aid	Filter	0.85 (1.7)

Exemplary plant water usage is given below. All process waters are recycled. The only wastes currently discharged emanate from contamination of once-through cooling water used on the barometric condensers on the product crystallizer. Plant 002 has plans to replace the barometric condensers with heat exchangers using non-contact cooling water. This should eliminate the hexavalent chromium waste completely. With this change, no process waste waters will be discharged.

A. Water Inputs to Plant

Type	Quantity cu m/day	Quantity l/kkg	Comments
River	1,325 (350,000 gpd)	97,200 (23,300 gal/ton)	Untreated except for macrofiltration
Municipal	245 (65,000 gpd)	18,100 (4,330 gal/ton)	Untreated

B. Water Usage

Type	Quantity cu m/day	Quantity l/kkg	Recycle
Cooling	1,325 (350,000 gpd)	97,200 (23,300 gal/ton)	0
Process (makeup)	245 (65,000 gpd)	18,100 (4,330 gal/ton)	100

Presently, the only effluent from this plant is cooling water, possibly contaminated with hexavalent chromium in the barometric condenser. Replacement of the condenser with a non-contact heat exchanger will eliminate cooling water contamination, although a larger amount of water will have to be used for the less efficient non-contact heat exchanger.

Potassium Sulfate

The bulk of the potassium sulfate manufactured in the United States is prepared by reaction of potassium chloride with dissolved langbeinite ore (potassium sulfate-magnesium sulfate). The langbeinite ore is mined and crushed and then dissolved in water to which potassium chloride is added. Partial evaporation of the solution produces selective precipitation of potassium sulfate which is recovered by centrifugation or filtration from the brine liquor, dried and sold. The remaining brine liquor is either discharged to an evaporation pond, reused as process water or evaporated to dryness to recover magnesium chloride. The fate of the brine liquor is determined by the saleability of the magnesium chloride by-product (depending on ore quality) and the cost of water to the plant. A diagram for the process used at plant 118 is given in Figure 48.

The table below presents a list of the raw wastes expected for potassium sulfate manufacture:

5707

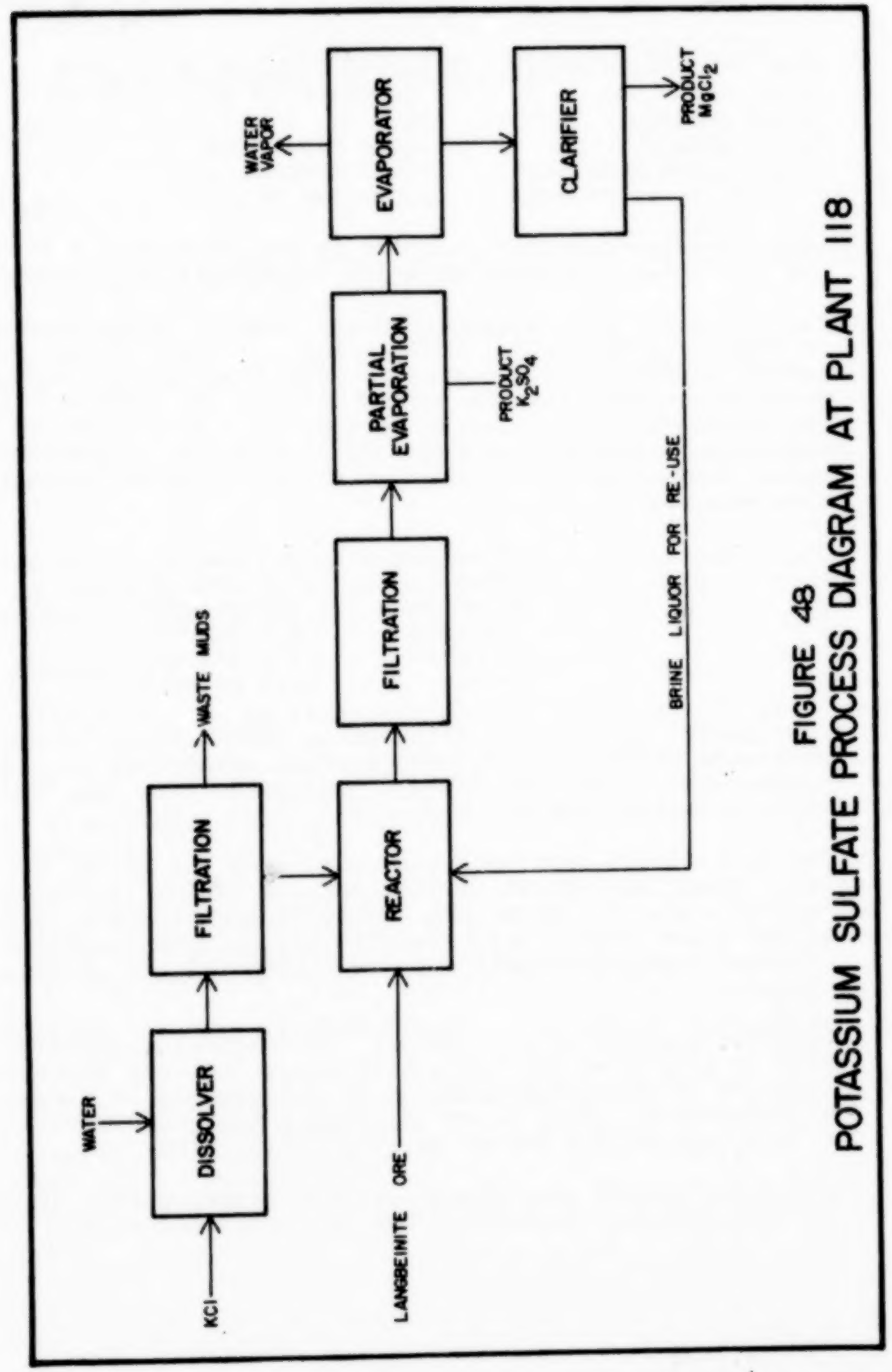

FIGURE 48
POTASSIUM SULFATE PROCESS DIAGRAM AT PLANT 118

5708

Waste Product	Process Source	kg/kkg of Product (lb/ton) Average	Range
Muds, (silica, alumina, clay and other insolubles)	Dissolution of langbeinite ore	15-30 (30-60)	-
Brine liquor (Saturated magnesium chloride solution)	Liquor remaining after removal of potassium sulfate	-	0-2000*

*Part of the magnesium chloride is recovered for sale and part of the remaining brine solution is recycled for process water.

The high value corresponds to the case of no recycle or recovery of magnesium chloride. These brines contain about 33 percent solids. The wastes consist of muds from the ore dissolution and waste magnesium chloride brines and are not affected by startup or shutdown. The latter brine can sometimes be used for magnesium chloride production if high grade langbeinite ore is used. Composition of the brine solutions after potassium sulfate recovery is:

Potassium	3.2 percent
Sodium	1.3 percent
Magnesium	5.7 percent
Chloride	18.5 percent
Sulfate	4.9 percent
Water	66.7 percent

The amount of brine produced is about 650 kg of solids/kkg of potassium sulfate (1300 lb/ton) after evaporation. For higher grade ores, the sodium content is lower. The data presented above were supplied by plant 118.

The muds listed above are separated from the brine solutions at this exemplary plant by filtration after dissolution of the langbeinite ore. These are recovered and disposed of as landfill on the plant site. The brine wastes, containing mostly magnesium chloride, are either disposed of or treated in three different manners:

1. Evaporation with recovery of magnesium chloride for sale. This is practiced only when high grade ores are processed.
2. Reuse of the brine solution in the process in place of using process water. This is normally done to a considerable extent.
3. Disposal of the brines in evaporation pits.

At plant 118, all three of the above options are practiced, depending on the quality of the ore being processed.

Water use at plant 118 is described below:

Water Inputs:

Type	Quantity cu m/day (mgd)	l/kkg (gal/ton)	Water Purity
Well Water	3,790 (1.0)	8,360 (2,000)	40 mg/l total solids

Water Flows:

Type	Quantity cu m/day (mgd)	l/kkg (gal/ton)	Percent Recycled
Cooling	13,600 (3.6)	30,000 (7,200)	60-70 percent (remainder evaporated)
Process	2,270 (0.6)	5,010 (1,200)	67 percent recycled, 33 percent lost either by evaporation or removal from system with product or by-product.

There are no effluent streams from the plant since much of the water is recycled. Most of the water losses occur during the process evaporation steps.

Sodium Bicarbonate

Sodium bicarbonate is manufactured by the reaction of soda ash and carbon dioxide in solution. The product bicarbonate is separated by thickening and centrifugation and is then dried, purified and sold. A detailed process diagram for plant 166 is given in Figure 49. This facility is located within a Solvay process complex.

A listing of raw wastes produced in bicarbonate manufacture at plant 166 is shown below. These consist of unreacted soda ash, solid sodium bicarbonate, boiler wastes and ash from power generation equipment. The ash is treated as a solid waste.

Waste Product	Process Source	kg/kkg of Product (lb/ton) Average	Range
1. Na_2CO_3	Slurry thickener overflow	38.0 (76.0)	0-375 (0-750)
2. Ash	Power generation	17.9 (35.8)	
3. Water purif. sludge	Boiler feed water purification	0.3 (0.6)	
4. $NaHCO_3$	Slurry thickener overflow	10.0 (20.0)	

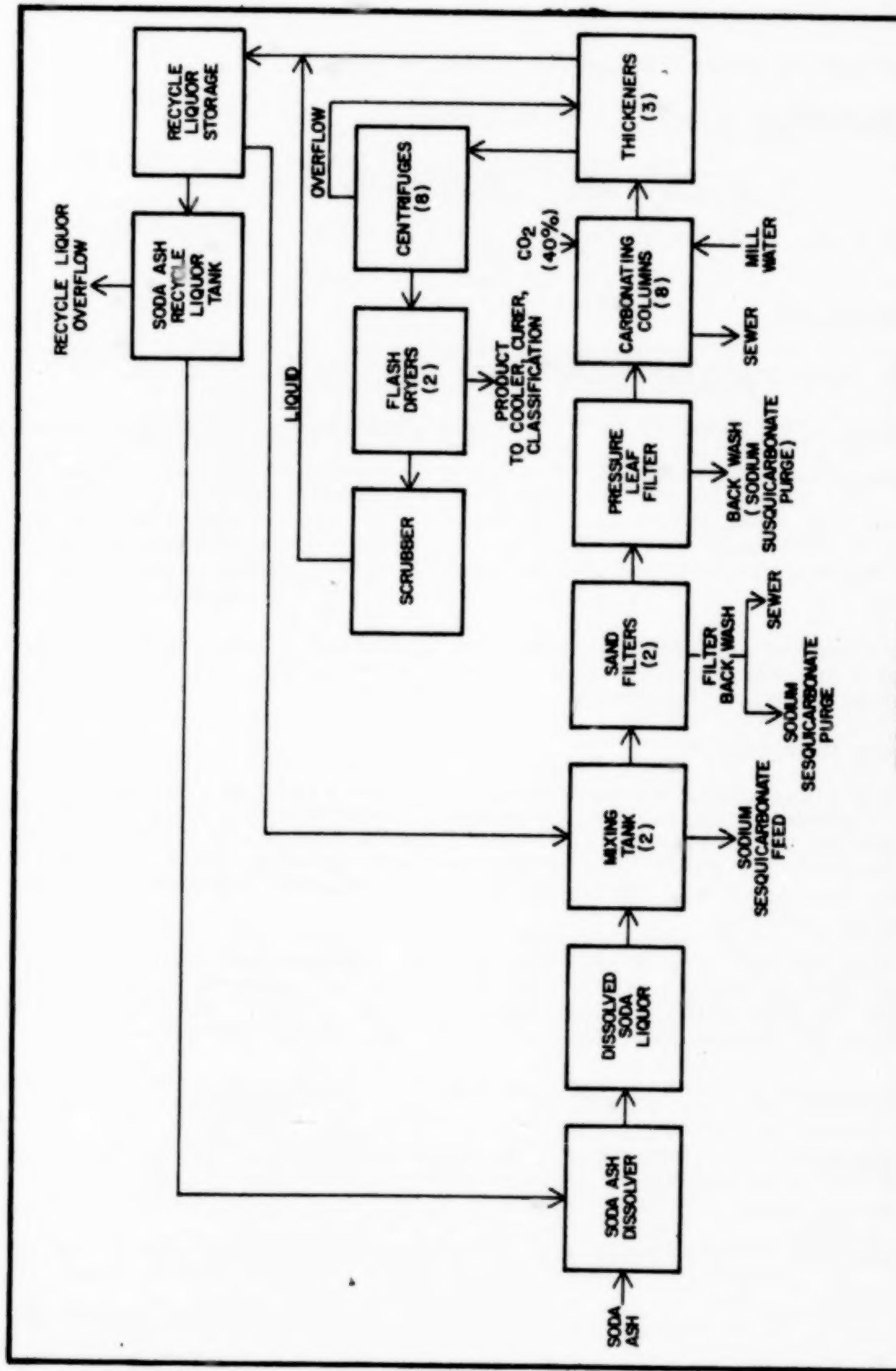

FIGURE 49
SOLVAY SODIUM BICARBONATE PROCESS FLOW DIAGRAM AT PLANT 166

The quantity of slurry thickener overflow depends upon the operation of another plant utilizing this by-product. The overflow is not constant, and occurs only when the sister plant mentioned above cannot absorb the entire flow. Consequently, the value shown above is based on an annual average, with a wide variation in flow over the period.

The water usage at plant 166 is shown below. Most of it is used for cooling purposes.

Water Inputs to Plant:

Type	cu m/day (mgd)	l/kkg (gal/ton)	Treatment
Lake	1,430 (0.378)	5,430 (1,300)	Chlorinated prior to use as cooling water
Municipal	119 (0.0315)	455 (109)	

Water Usage:

Type	cu m/day (mgd)	l/kkg (gal/ton)	Recycled
Cooling	1,430 (0.378)	5,430 (1,300)	None
Process	119 (0.0315)	455 (109)	variable

Treatments are carried out for the two emerging waste streams. These streams are fed to settling ponds to remove suspended solids and then discharged.

Stream	Source	l/kkg (gal/ton)	Treatment	Disposal
Settling Pond Overflow	Slurry thickener	287 (69)	Settling Pond	Plant Effluent
Cooling Water (Discharge)	Various heat exchange devices found throughout plant	5,430 (1,300)	a) Containment of wastes b) Cooling water segregation c) Some water recycling d) Collection and sampling of wastes	Effluent

Individual effluents from this plant are combined with other sewer effluents. Some wastes are treated in conjunction with soda ash plant wastes. Tabulated loads are based on reasonable allocations.

The effluent from plant 166 contains 20,000 mg/l of dissolved solids (mostly dissolved carbonates), amounting to 5.75 kg/kkg of product (11.5 lb/ton). All of the bicarbonate wastes are treated

along with chlor-alkali and soda ash wastes at the 166 facility in a common treatment system prior to discharge. There are no net effluent loads to the cooling water based on average daily operation. There are no organics in the plant effluent.

Plant 166 has plans to use the weak slurry thickener overflow, which constitutes their present source of waste, as a source of liquid for the product dryer scrubber and to recycle this liquid (concentrated with respect to sodium carbonate) back to the process. These process changes will eliminate the discharge of process waste waters.

Verification measurements on the plant intake water, cooling water, and effluent are given in Table 18. The similarity of composition of plant intake and cooling water discharge verifies segregation of cooling water from process water. The process effluent measured is the effluent of the whole plant complex and hence is not indicative of that of an isolated bicarbonate unit.

Sodium Carbonate

Soda ash is produced by mining and by the Solvay Process. In the Solvay Process sodium chloride brine is purified to remove calcium and magnesium compounds. It is reacted with ammonia and carbon dioxide produced from limestone calcination to yield crude sodium bicarbonate which is recovered from the solutions by filtration. The bicarbonate is calcined to yield soda ash. The spent ammonia solution is reacted with slaked lime and distilled to recover ammonia values for process recycle. The calcium chloride formed as a by-product during the distillation is either discharged as a waste or recovered by evaporation. Figure 50 shows a process flowsheet for the facility at plant 166. Although all Solvay Process plants have high dissolved solids effluents, this plant is unusual in that it recovers a significant amount of an otherwise wasted by-product. Since the market for calcium chloride will not absorb the by-product generated from such recovery from all Solvay plants, this plant cannot be considered to be exemplary on this basis.

The raw waste loads for the 166 facility consist of brine purification muds, unreacted sodium chloride and the calcium chloride by-product, as follows:

TABLE 18. Plant 166 Verification Data

Parameter	Plant Intake Measured	Plant Intake Furnished	Bicarbonate Cooling Water	Plant Complex Effluent
Flow, cu m/day (MGD)	Not measured	188,000 (49.5)*	Not Measured	17,400 (4.6)
Temperature, °C	11.2	-	Not Measured	Not Measured
Color (Apparent) APHA Units	20	-	270	275
Turbidity, FTU	10	27	30	0
Conductivity,				
mg/l NaCl	2000	-	1800	67,000
micromhos/cm	3800	-	3400	118,000
Suspended Solids, mg/l	5	-	160	206
Dissolved Solids, mg/l	2850	-	2560	76,000
pH	7.80	-	7.75	10.8
Acidity:				
Total, mg/l $CaCO_3$	0	-	0	0
Free, mg/l $CaCO_3$	0	-	0	0
Alkalinity (Total)				
P, mg/l $CaCO_3$	0	-	0	460
T, mg/l $CaCO_3$	195	171	305	610
Hardness:				
Total, mg/l $CaCO_3$	1300	1428	1000	45,000
Calcium, mg/l $CaCO_3$	1250	571	950	45,000
Halogens:				
Chlorine, mg/l	0.1	-	1.9	0
Chloride, mg/l	1525	-	1275	-
Fluoride, mg/l	0.45	-	0.50	1.36
Sulfate, mg/l	170	-	130	640
Phosphates Total, mg/l	1.1	-	1.0	0.7
Nitrogen Total, mg/l N	0.55	-	0.43	1.7
Heavy Metals: Iron mg/l Fe	0.07	-	0	0.48
Chromate, mg/l Cr^{+6}	0.01	-	0	0
Oxygen (Dissolved), mg/l O_2	4.7	-	13	4

*Furnishes cooling water to whole plant

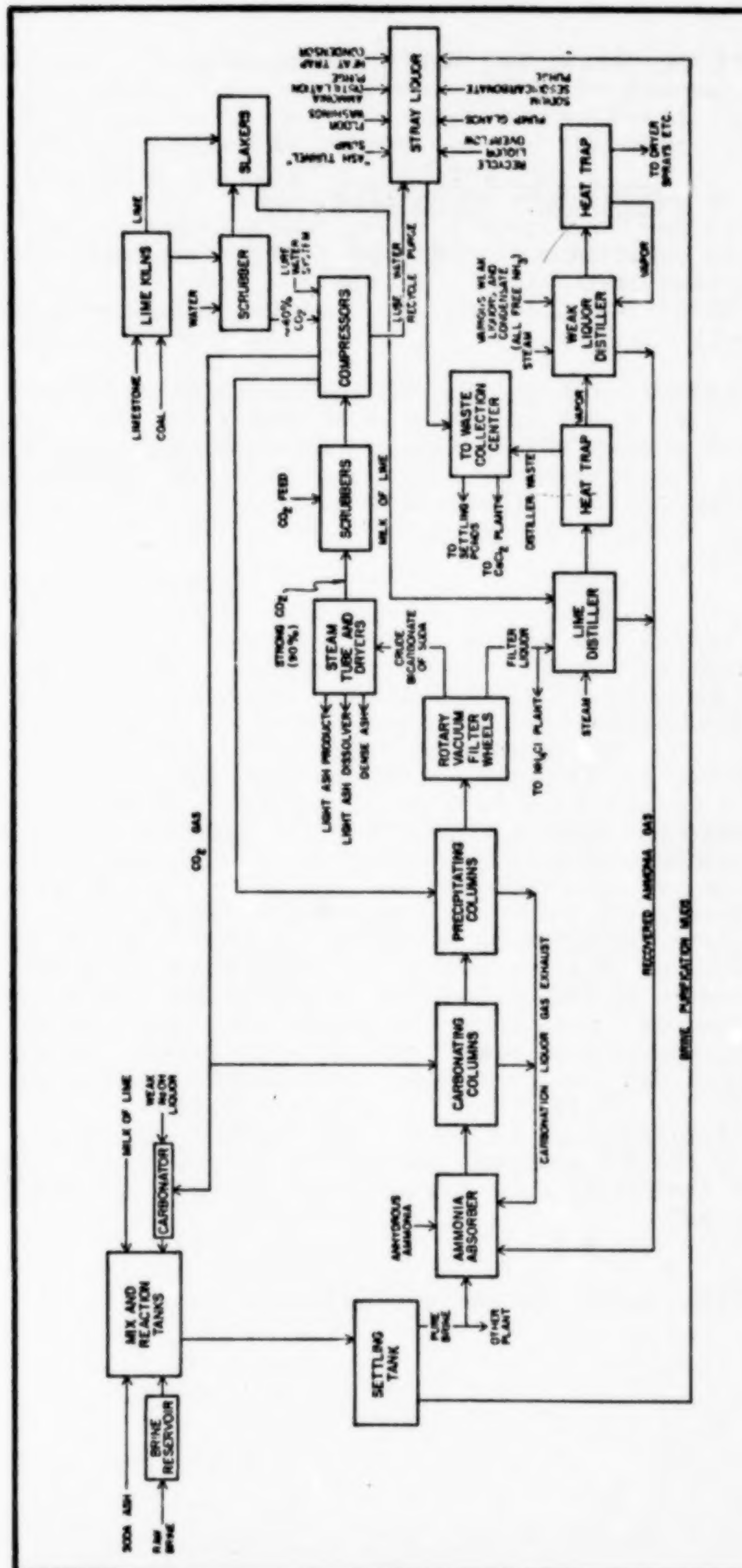

FIGURE 50
SOLVAY SODA ASH PROCESS FLOW DIAGRAM AT PLANT 166

Waste Products	Process Source	kg/kkg of Soda Ash (lb/ton)
1. $CaCO_3$	DS, B, P	84.5 (169)
2. Na_2CO_3	B	0.3 (0.6)
3. $CaSO_3$	DS	31 (62)
4. NaCl	DS, B	510.5 (1021)
5. $CaCl_2$	DS	1090 (2180)
6. Na_2SO_4	B	0.8 (1.6)
7. $Fe(OH)_3$	B	0.1 (0.2)
8. $Mg(OH)_2$	DS, B, P	48.5 (97)
9. CaO (inactive)	DS, B	109.5 (219)
10. NaOH	B	0.05 (0.1)
11. SiO_2	DS, B	58.5 (117)
12. CaO (active)	DS	24 (48)
13. NH_3	DS	0.15 (0.3)
14. H_2S	DS	0.02 (0.04)
15. Ash & Cinders	P	40 (80)

DS = Distillation, B = Brine, P = Power

Water Inputs to Plant:

Type	l/kkg (gal/ton)	Comments
River	3,650 (875)	Sent to Power Section for boiler feed water
Lake	4,680 (1,120)	Treated prior to use with chlorine
Municipal	2,030 (486)	Majority is sent to Power Section for boiler feedwater

Water Flows:

Type	l/kkg (gal/ton)	Recycled
Cooling	52,100 (12,500)	
Process	4.5 (1.1)	0
Sanitary	Est. 74-149 (18-36)	0
Boiler Feed	5,420 (1,300)	0

The maximum process water use is about 149 l/kkg (36 gal/ton), but the average is only 4.5 l/kkg (1.1 gal/ton).

Most of the water use is for cooling purposes and little stream recycling is employed. Treatment methods in use are:

Stream	Source	Treatment	Disposal
Cooling water effluent	Various heat exchangers throughout plant	a. Internal recycle b. Segregation of waste c. Collection and containment of wastes	Disposal to cooling water sewer system
Settling pond effluent	Distiller wastes	Settling out suspended solids with coagulation and precipitation of metals and other chemicals	Discharge to source of cooling water

Individual effluents from this plant are combined with other effluents.

Treatment consists of use of settling ponds and some pH control prior to discharge. The performance of this treatment is detailed below:

Method	Qualitative Rating	Waste Reduction Accomplished
Evaporation of distiller waste	Good	Reduces CaCl by 21 percent NaCl by 4 percent
Settling Ponds	Excellent	Suspended solids reduced by 99 percent+

In addition, two other methods of treatment are used or planned:

(1) part of the wastes may be used for municipal waste treatment.
(2) part of the raw distiller waste stream is diverted to a small plant for calcium chloride recovery. About 21 percent of the calcium chloride in the raw waste is recovered on this sidestream.

The plant effluent after treatment contains about 100,000 mg/l dissolved solids (mostly NaCl and $CaCl_2$) in the process waste stream and is also fairly high in suspended solids. This type of effluent is typical of a Solvay process plant.

Calcium Chloride Recovery

The flow diagram for the calcium chloride recovery process at plant 166 is shown in Figure 51. The waste stream is first cycled through a number of partial evaporation and filtration steps to concentrate the waste solutions. After this, further partial evaporation is used to selectively remove the sodium chloride from solution and then total evaporation is used to recover calcium chloride from the remaining solution.

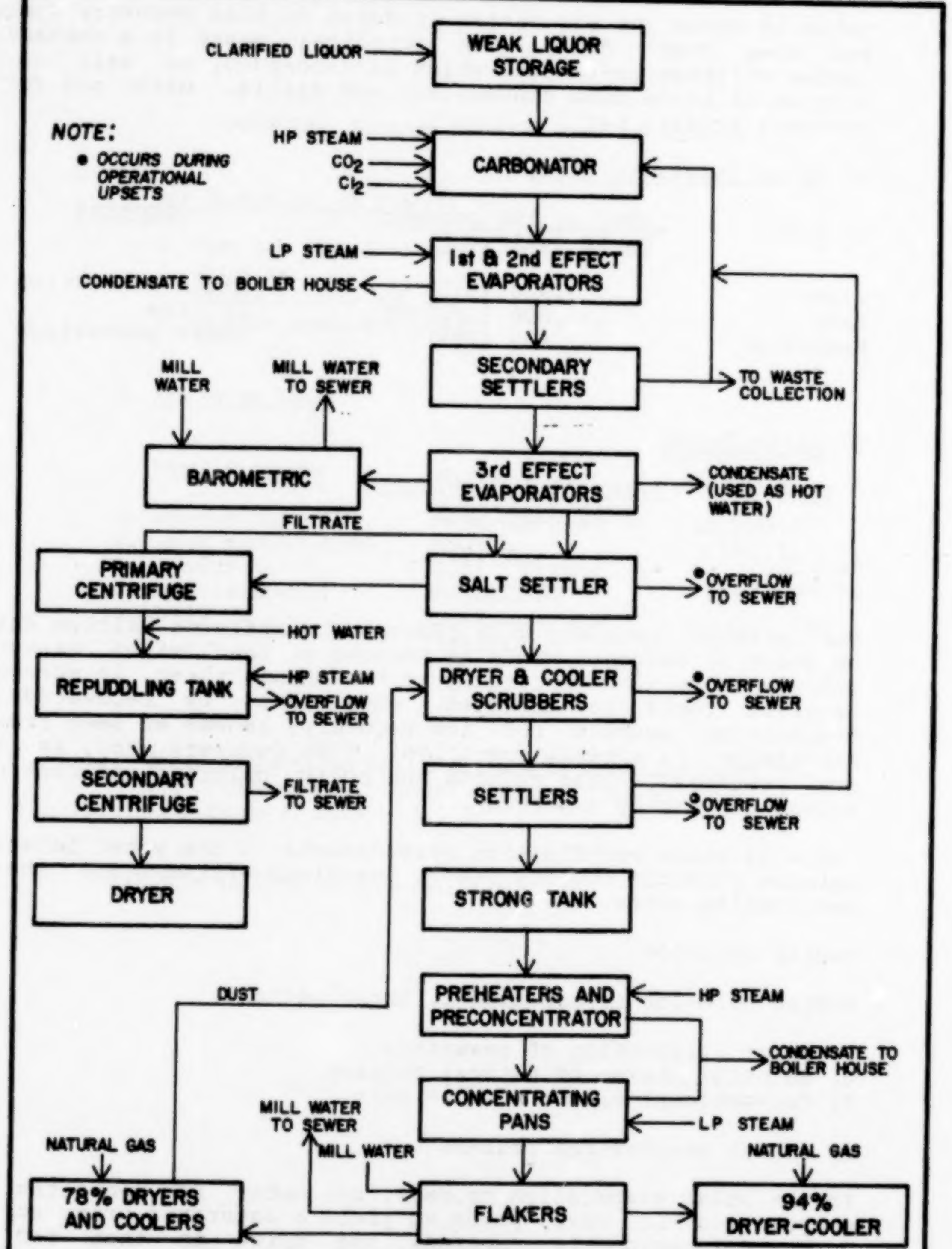

FIGURE 51
CALCIUM CHLORIDE RECOVERY PROCESS AT PLANT 166

Table 19 shows the raw wastes produced in this recovery operation and some other data. The principal waste is a contaminated sodium chloride co-product which is discarded, as well as some calcium chloride from condensates and spills. Water use for this recovery process is:

A. Water Inputs to Plant

Type	l/kkg of 100 percent $CaCl_2$ (gal/ton)	Comments
River	3,910 (938)	Steam generation
Lake	118,500 (28,400)	Cooling
Municipal	434 (104)	Steam generation

B. Water Usage

Type	l/kkg of 100 percent $CaCl_2$ (gal/ton)
Cooling	118,500 (28,400)
Process	3,850 (923)

The present recovery unit reduces the effluent calcium chloride by about 21 percent. This is because of the limited market for calcium chloride. According to the manufacturer, if more of the material could be marketed, more would be recovered. An evaporation process for its recovery, as can be seen from this discussion, is already operative. This recovery step, as it is now practiced, also reduces the sodium chloride effluent of the Solvay process by 4 percent.

Table 20 shows verification measurements on the water intake, the calcium chloride cooling water, the final effluent and the soda ash cooling water.

Sodium chloride

Sodium chloride is produced by three methods:

1) Solar evaporation of seawater;
2) Solution mining of natural brines;
3) Conventional mining of rock salt.

a) Solar evaporation process

In the solar evaporation process, sea water is concentrated by evaporation in open ponds to yield a saturated brine solution. After saturation is reached, the brine is then fed to a crystallizer, wherein sodium chloride precipitates, leaving

TABLE 19. Calcium Chloride Recovery Process

A. Raw Materials for Product

1. Soda ash distiller waste
2. Chlorine
3. Carbon dioxide 40% CO2
4. Captive steam and power

B. Raw Waste Loads

Waste Products	Process Source	kg/kkg (lb/ton) of Product*
1. Ash and cinders	Steam and power	42.5(85)
2. Water purification sludge	Steam	0.75(1.5)
3. NaCl co-product	Evaporation	235(470)
4. CaCl2	Condensates and spills	35-50(70-100)

C. Comments

Ratio of $CaCl_2$ to NaCl available in distiller waste is approximately 1.4. Market demand at this location is at a ratio of 10.6 to 1.

*Product is 100% calcium chloride.

TABLE 20. Verification Measurements at Plant 166

Parameter*	Water Intake	CaCl2 Cooling Water	Final Effluent	Soda Ash Cooling Water
Flow, cu m/day	Not Measured	Not Measured	17,400	Not Measured
Temperature, °C	11.2	23.8	-	"
Color (Apparent) APHA Units	20	35	275	110
Turbidity, FTU	10	15	0	5
Conductivity, micromhos/cm	2000 (NaCl); 3800	4000 7500	67,000 118,000	21,000 4,400
Suspended Solids	5	10	170	30
pH	7.80	7.95	10.8	7.8
Acidity: Total	0 CaCO3	0	0	0
Free	0 "	0	0	0
Alkalinity (Total) P	0 "	0	460	0
T	195 "	190	610	240
Hardness: Total	1300"	1400	45,000	1,270
Calcium	1250"	1350	45,000	1,120
Halogens: Chlorine	0.1	0.6	0	1.7
Chloride	1525	2600	50,000	1,350
Fluoride	0.45	0.55	1.36	0.6
Sulfate	170	170	640	190
Phosphates (Total)	1.1	1.2	0.7	1.6
Nitrogen (Total)	0.55	0.58	1.7	0.48
Heavy Metals: Iron	0.07	0.18	0.48	0.12
Chromate	0.01	0	0	0
Oxygen (Dissolved)	4.7	7.7	4	10
COD	175	-	-	-

*mg/l unless otherwise specified.

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behind a concentrated brine solution (bittern) consisting of sodium, potassium and magnesium salts. The precipitated sodium chloride is recovered for sale and the brine is then further evaporated to recover additional sodium chloride values and is then either stored, discharged back to salt water or further worked to recover potassium and magnesium salts.

In the solar evaporation process, all of the wastes are present in the bittern solution. Typical bittern analysis for the exemplary 059 facility is given in Table 21. No bittern is discharged from this facility. The bittern is stored and, in the past, has been worked for recovery of other materials.

At plant 059, treatment consists of storage and further use of the bittern materials. The plant water usage is:

Type	Use	Source	cu m/day (mgd)	l/kkg (gal/ton)	Recycle
Process	Refining process	Well	2,270 (0.60)	894 (214)	100 percent
Process	Raw Material	Bay	327,000 (86.4)	129,000 (30,900)	None

As the bitterns are stored and further worked, there is no discharge. Eventual total evaporation after further bittern use yields only solid wastes. Sufficient land and ponding area is available at the 059 facility to store bitterns for the next 30-50 years.

b) Solution brine-mining process

Saturated brine for the production of evaporated salt is usually obtained by pumping water into an underground salt deposit and removing the saturated salt solution from an adjacent interconnected well, or from the same well by means of an annular pipe. Besides sodium chloride, the brine will contain some calcium sulfate, calcium chloride, magnesium chloride, and lesser amounts of other materials including iron salts and sulfides.

The chemical treatment given to brines varies from plant to plant depending on the impurities present. Typically, the brine is first aerated to remove hydrogen sulfide and, in many cases, small amounts of chlorine are added to complete sulfide removal and oxidize all iron salts present to the ferric state. The brine is then pumped to settling tanks where it is treated with soda ash and caustic soda to remove most of the calcium, magnesium and iron present as insoluble salts. After clarification to remove these insolubles, the brine is sent to multiple-effect evaporators. As water is removed, salt crystals form and are removed as a slurry. After screening to remove lumps, the slurry is washed with fresh brine to remove fine

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TABLE 21. Chemical Analysis of Bittern

Parameter*	
pH	7.8
Total Solids	241550
Total Volative Solids	86600
Total Suspended Solids	1760
Total Dissolved Solids	239790
Alkalinity as $CaCO_3$	2800
BOD	198
COD	6350
Ammonia as N	0.702
Kjeldahl Nitrogen Total	32.610
Nitrate as N	37.50
Phosphorus Total as P	0.22
Chloride	158000
Cyanide	0.04
Fluoride	74.90
Phenols	0.064
Sulfate as S	21000
Sulfide as S	2
TOC	900
Aluminum	2.5
Arsenic	0.04
Cadmium	0.02
Calcium	450
Chromium	0.02
Iron	6.5
Mercury	0.001
Sodium	5500
Titanium	0.02
Zinc	0.19

* All units mg/l unless otherwise specified.

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crystals of calcium sulfate from the mother liquor to the slurry. These solids are returned to the evaporator. The calcium sulfate concentration in the evaporator eventually builds up to the point where it must be removed by "boiling out" the evaporators.

The washed slurry is filtered, the mother liquor is returned to the evaporators, and the salt crystals from the filter are dried and screened. Salt thus produced from a typical brine will be of 99.8 percent purity or greater. Some plants do not treat the raw brine, but control the calcium and magnesium impurities by watching the concentrations in the evaporators and bleeding off sufficient brine to maintain predetermined levels. By such methods, salt of better than 99.5 percent purity can be made. In either case, the final screening of the dried salt yields various grades depending on particle size. The facility at plant 030 is similar to the standard flow diagram shown in Section IV.

A detailed list of the raw wastes and their process sources is shown below. These include wastes from the multiple evaporators and dryers, sludges from basic purification, as well as water treatment chemicals used for the cooling water:

Waste Products	Process Source	Avg. kg/kkg of Product (lb/ton)
NaOH	Boiler Blowdown	0.0055 (0.011)
Na_3PO_4	" "	0.0015 (0.003)
Na_2SiO_3	" "	0.0025 (0.005)
Na_2SO_3	" "	0.0015 (0.003)
NaCl & $CaSO_4$	Purge from multiple evaporator	0.045 (0.090)
NaCl	Evaporator	0.04 (0.08)
NaCl	Barometric condenser	1.1 (2.2)
NaCl	Miscellaneous sources	-
Brine sludges	Brine purification	91 kkg/year (100 ton/year)

The brine sludges are returned to the brine wells for settling and disposal.

Well water for brine field use is taken into the plant at a rate of 2,240 l/kkg of product (536 gal/ton). Lake water for cooling and other uses is drawn into the plant at a rate of 48,000 l/kkg (11,400 gal/ton).

Use	Flow	Recycle
Cooling (barometric condensers)	41,700 l/kkg (10,000 gal/ton)	none
Other (dust collection pumps)	6,400 l/kkg (1,540 gal/ton)	90 percent

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Treatments of the effluent streams are as follows:

Stream No.	Source	Treatment
1	Condenser Discharge	To Lake
2	Storm Drain	To Lake
3	Tunnel Line (Lake Water)	To Lake
4	Ash Lime Discharge	Recycled

The storm drain flow cited above was 3,790 l/kkg of product (910 gal/ton) on the average.

The plant effluent streams #1 and #2 after treatment consist solely of streams containing 100 mg/l chloride at a pH of 8.2. Chloride concentration at the plant intake was given as 70-80 mg/l, with a pH of 8.2. Table 22 shows verification measurements on the plant intake and condenser discharge (stream #1) effluent. The chloride content and pH as stated are verified within a reasonable margin.

Sodium Dichromate and Sodium Sulfate

Sodium dichromate is prepared by calcining a mixture of chrome ore ($FeO.Cr_2O_3$), soda ash and lime, followed by water leaching and acidification of the soluble chromates. The insoluble residue from the leaching operation is recycled to leach out additional material.

During the first acidification step, the pH of the chromate solution is adjusted to precipitate calcium salts. Further acidification converts it to the dichromate and a subsequent evaporation step crystallizes sodium sulfate (salt cake) out of the liquor. The sulfate is then dried and sold. The solutions remaining after sulfate removal are further evaporated to recover sodium dichromate. Chromic acid is produced from sodium dichromate by reaction with sulfuric acid. Sodium bisulfate is a by-product. Figure 52 shows a detailed flowsheet for the exemplary facility at plant 184.

Plant 184 manufactures only sodium dichromate and chromic acid. However, some other chromate plants do convert part of their chromic acid products to potassium dichromate. All of this latter material is made in plants that produce other chromates.

The raw waste loads expected from the manufacture of sodium dichromate and its by-product sodium sulfate are given below. The bulk of the waste originates from the undigested portions of the ores used. These materials are mostly solid wastes. The wastes arising from spills and washdowns contain most of the hexavalent chromium. The wastes from water treatment and boiler

TABLE 22. Verification Measurements at Plant 030

Parameter*		Intake	Condenser Discharge
Flow, cu m/day (MGD)		37,900(10)	37,900(10.0)
Temperature, °C		13	22.5-23.0
Color, APHA Std.		40	40
Turbidity(FTU)		10	15
Conductivity(NaCl)		225	320
Suspended Solids		0	0
pH		8.0	8.1
Acidity: Total		0	0
Free		0	0
Alkalinity (Total)	P	0	0
	T	139	140
Hardness: Total		171	189
Calcium		128	147
Halogens: Chloride		65	120
Sulfate		13	37
Phosphates		0.07	0.1
Nitrogen		0.17	0.17
Heavy Metals: Iron		0.24	0.23
Oxygen (Dissolved)		-	2.8
COD		55	50

*mg/l unless otherwise specified.

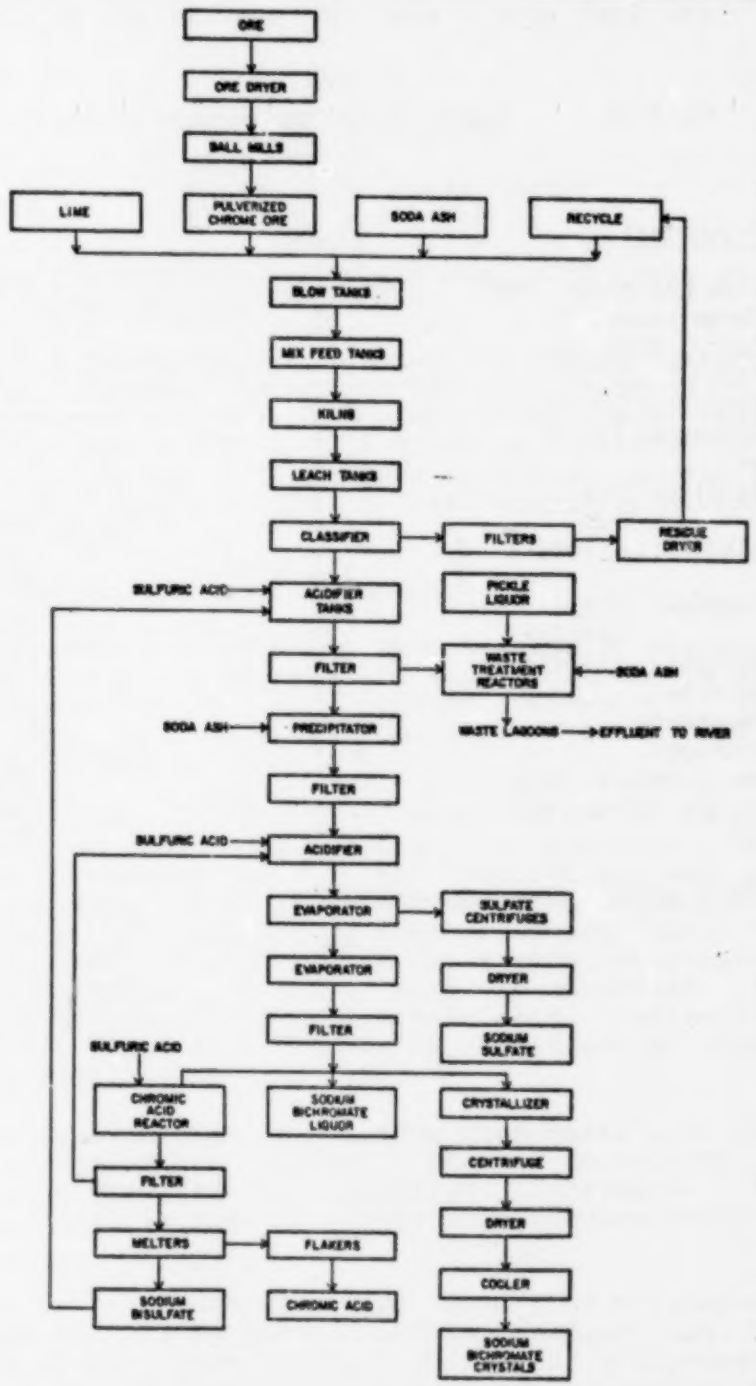

FIGURE 52
CHROMATE MANUFACTURING FACILITY
AT PLANT 184

blowdowns are principally dissolved sulfates and chlorides. The manufacture of chromic acid contributes no additional wastes.

Waste Product	Process Source	kg/kkg of $Na_2Cr_2O_7$ Product (lb/ton) Average	Range
1. Chromate wastes (Materials not digested in H_2SO_4)	Residues	900 (1800)	-
2. Washdowns* spills, etc.	--	0.75 (1.5)	0.5-1 (1-2)
3. Blowdown	Boilers and cooling towers	--	0.5-1 (1-2)

*Includes contributions from the chromic acid unit.

Water intake to this facility consists of river water and well water in the following amounts based on sodium dichromate product: 12,700 l/kkg (3,030 gal/ton) and 1,840 l/kkg (440 gal/ton) respectively. The boiler feed comes from the river water feed and is softened prior to use. The well water is all filtered, softened and chlorinated.

Water Use:

Type	l/kkg of sodium dichromate (gal/ton)	Percent Recycled
Cooling	275,000 (66,000)	98.2
Products and Evaporation	5,400 (1,300)	0
Waste Treatment	8,860 (2,120)	0
Sanitary	255 (60)	0

Waste waters are treated with pickle liquor to effect reduction of chromates present. All effluent waters are lagooned to settle out suspended solids. This treatment removes 99 percent of the hexavalent chromium and the discharge contains 0.01 mg/l. The lagoon discharges to a nearby river when full.

All rainwater, washdowns, spills and minor leaks in the part of the plant which handles hexavalent chromium are captured in the area's sumps and used in the process. Storage facilities are provided to contain a heavy rain and return the water either to the process or to treatment. Separate rainwater drainage is provided for areas not handling hexavalent chromium. Sewers are continuously monitored. A batch system is used in the treatment process. Each batch is treated and analyzed before release to the lagoon.

Data on the effluent from this exemplary chromate treatment facility are presented below:

	Average	Range
Flow, liters/kkg (gal/ton)	8,860 (2,120)	-
Total Suspended Solids, mg/l	14	1-24
Total Dissolved Solids, mg/l	10,000	5,000 - 13,000 (mostly chlorides)
pH	7.2	6.0 - 8.5
Cr+3, mg/l	0.14	0.01 - 0.31
	(mostly in form of suspended solids)	
Cr+6, mg/l	0.01	

The chromium content has been significantly reduced. However, the amount of sodium chloride being discharged is significant. Based on the porcus nature of the present lagoon walls and the high dissolved solids content discharged into the river, this plant is considered exemplary only from the standpoint of chromate control and treatment.

Table 23 gives a more detailed presentation for the river intake and plant effluent from this facility. The composition of river water taken near the plant and the plant effluent determined on two separate occasions are shown as a range of values. These data were furnished by the plant.

Tables 24 and 25 present data obtained by sampling for this facility. Table 24 shows an analysis of river water drawn adjacent to the plant. Table 25 shows the compositions of waste stream before and after passage through the pickle liquor treatment unit.

Sodium Metal

Sodium is manufactured by electrolysis of molten sodium chloride in a Downs electrolytic cell. After salt purification to remove calcium and magnesium salts and sulfates, the sodium chloride is dried and fed to the cell, where calcium chloride is added to give a low-melting $CaCl_2$-NaCl eutectic, which is then electrolyzed. Sodium is formed at one electrode, collected as a liquid, filtered and sold. The chlorine liberated at the other electrode is first dried with sulfuric acid and then purified, compressed, liquified and sold. Figure 53 shows the process in use and waste treatment facilities at plant 096.

There is no waste during operation of an individual cell for the molten salt electrolysis step in the Downs cell process. The cells are run in banks, and individual cells are cleaned out and refilled after the electrolyte is depleted. All of the wastes arise from this cleaning and refilling of individual cells.

TABLE 23. Intake and Effluent Composition at Plant 184

Parameter	River Water	Plant Effluent
Total Solids	79	330-334
Organic Solids	45	93-104
Mineral Solids	34	230-232
Alkalinity as $CaCO_3$ (methyl-orange)	2.0	0.0
Alkalinity (phenolphthalein)	0.0	0.0
Free Carbon Dioxide	1.6	1.0-17.0
Total Hardness (as $CaCO_3$)	15	209.3-238.7
Total Hardness (grains per gallon)	0.88	12.2-12.8
pH	6.4	7.4-8.4
Analysis of Mineral Solids:		
Silica (SiO_2)	2.6	5.0-6.0
Iron Oxide (Fe_2O_3)	0.4	0.1-0.3
Alumina (Al_2O_3)	0.8	0.0
Lime (CaO)	5.6	114.4-115.5
Magnesia (MgO)	2.0	0.8-5.0
Sulphate (SO_3)	6.8	3.4
Chloride (Cl)	8.9	1.3-1.8
Soda (Na_2O)	5.7	8.2-10.4
Manganese (Mn)	0.0	0.0
Fluoride (F)	0.0	0.0
Biochemical Oxygen Demand (BOD_5)	less than 5	-
Color (Pt-Co)	130	
Chromium (Cr)	-	**
Tannin	2.6	**

*mg/l unless otherwise specified
**None found

TABLE 24. Analysis of River Water at Plant 184

Parameter	Measurements (mg/l unless otherwise specified
Color, APHA Units	270
Turbidity, FTU	5
Conductivity	35 NaCl eq.
Suspended Solids	5
pH	6.59
Alkalinity (Total)	phen-0/Total-20 (as $CaCO_3$)
Hardness: (Total)	23 (as $CaCO_3$)
(Calcium)	15
Halogens: Chloride	11
Sulfate	0
Phosphate	0.38
Nitrate	0.13 (as N)
Heavy Metals: Iron	1.5
Chromium (Cr+6)	0*

*less than 20 mcg/l

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TABLE 25. Analysis of Waste Treatment Streams at Plant 184

Parameter	Before Treatment	After Treatment
Flow	Batch volume - 28,700 liters	Batch volume - 30,400 liters
Temperature, °C	49	61
Color	500 (supernatant liquid)	70
Conductivity	5000 NaCl	14,500
Dissolved Solids	10,700	18,000
Suspended Solids	170,000	154,000
pH	10 (straight); 9.3 (dilution)	9.1 (supernatant, fresh); 8.4 (filtered, 30 days old)
Alkalinity (Total)	phen-0/total-1000 (as $CaCO_3$)	phen-2/total-23 (as $CaCO_3$)
Hardness: Total	600 (as $CaCO_3$)	6,000
Calcium	520 (as $CaCO_3$)	6,000
Halogens: Chloride	310	8,700
Sulfate	3,900	1,900
Phosphate	0.7	0.7
Nitrate	9.8 (as N)	-
Heavy Metals:		
Chromium (Cr+6)	1,300	0.01
Iron	-	0.60
Oxygen (Dissolved)	10.4	-

*mg/l unless otherwise specified.

5732

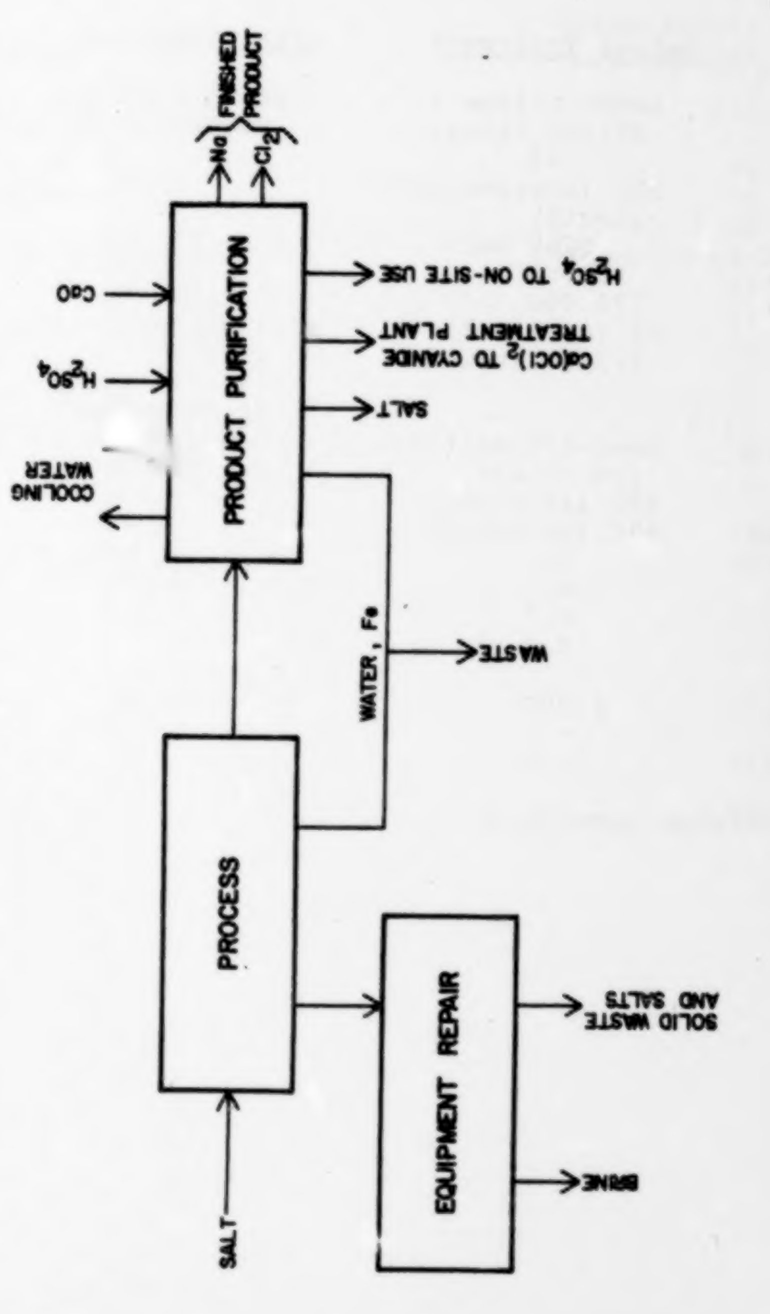

FIGURE 53 WASTE TREATMENT ON DOWNS CELL AT PLANT 096

The wastes produced by sodium manufacture at plant 096 are shown below. Several of the expected wastes are not present. This is due to the reuse of materials in other parts of the facility to make other products. For example, the sulfuric acid used in drying the chlorine is reused.

Waste Products	Process Source	kg/kkg of Product (lb/ton)
NaCl	Process	50-65 (100-130)
Misc. Alkaline Salts	Process	25-35 (50-70)
$Ca(OCl)_2$	Chlorine Recovery	45-75 (90-150)
Fe	Cooling Tower	0.065-0.095 (0.13-0.19)

The process does not normally shut down. The discharges result from the replacement of cells.

Cooling tower blowdowns and residual chlorine from tail gas scrubbers are discharged without treatment. The stream containing calcium hypochlorite wastes is used to treat cyanide wastes. Cooling water is discharged without treatment and tank wash and runoff water are first ponded to settle out suspended materials and then discharged.

The water input to the plant is well water in the amount of 2,730 cu m/day or 46,300 l/kkg of product (11,100 gal/ton), having an impurity content of:

Total Solids	110-125 mg/l
CO_2	30-60 mg/l
Hardness (as Ca)	80-100 mg/l
Fe	1-3 mg/l
Cu	0.02-0.06 mg/l
Zn	0.02 mg/l
Sulfate	2-7 mg/l
Alkalinity ($CaCO_3$)	70-100 mg/l

The water use within the plant is as follows:

Use	Flow	Amount
Cooling	29,100 cu m/day (7.7 mgd)	497,000 l/kkg (119,000 gal/ton)
Process	530 cu m/day (0.14 mgd)	9,000 l/kkg (2,150 gal/ton)

Table 26 lists the various plant waste streams and their compositions.

These stream effluents consist mostly of dissolved sodium chloride and other chlorides. Table 27 shows the results of analyses of simultaneous samples from three of the waste streams (those

TABLE 26. Plant 096 Effluent

Parameter*	Stream No. 1**	Stream No. 2***	Stream No. 3****	Stream No. 4*****
Flow, cu m/day (MGD)	409(0.108)	133(0.035)	1,780(0.470)	409(0.108)
TSS	30-50	50-70	5-10	-
TDS	400-600	-	300-400	-
BOD	-	-	-	-
COD	-	-	-	-
pH	6.5-7.5	10.5-12.0	6.7-7.5	-
Fe	2	1-2	2-3	-
Chloride	100-150	10,000-30,000	50-100	13,000
Chlorine	-	4,000-6,000	20-100	-
Sulfate	-	-	25-50	-
Total Hardness	-	-	180-225	-
Phosphate	0.2	-	-	-
Turbidity(FTU)	25-30	40-60	125	-
Color(APHA)	15	15	15	-
Acidity(Free)	20-30	20-30	-	-
Alkalinity (Total)	-	4,000-6,000	-	-
Hardness(Ca)	-	25,000-30,000	-	-

*All units mg/l unless otherwise specified.
**Cooling Tower Blowdown, Cl_2 Residual.
***Calcium hypochlorite used to treat cyanide wastes in another process.
****Cooling water.
*****Runoff, excess calcium hypochlorite, tank washup.

Note: There is also 2,270 liters/day (600 GPD) used sulfuric acid sent for use elsewhere in the complex and not discharged into surface streams.

TABLE 27. Plant 096 Effluent

Parameter*	Stream No. 2	Stream No. 3	Stream No. 4
Flow, cu m/day (MGD)			
Plant	-	-	-
VM**	133(0.035)	1,590(0.42)	-
Temperature, °C			
Plant	-	-	-
VM	21.5	22	20
Color(True), APHA Units			
Plant	15	15	15
VM	300	30	260
Turbidity, Jackson Units			
Plant	26	25	58
VM	82	10	45
Suspended Solids			
Plant	39	6	137
VM	39	11	90
Dissolved Solids			
Plant	574	355	-
VM	479	266	35,800
pH			
Plant	6.5	6.45	11.9
VM	6.55	6.44	11.9
Acidity(Free)			
Plant	19.5	37.5	-
VM	-	-	-
Alkalinity($CaCO_3$)			
Plant	-	-	-
VM	48	57	4,500
Chlorine			
Plant	0	0.6	64,000
VM	0	0.2	2,400
Chloride			
Plant	121	92	17,800
VM	125	90	26,500
Sulfate			
Plant	-	26	-
VM	-	10	-
Fe			
Plant	0.33	0.69	0.92
VM	0.22	2.7	0.7

*mg/l unless otherwise specified.
**Verification measurement

corresponding to streams 2, 3, and 4 of Table 26). Good agreement between the results was generally obtained.

This facility has good pH and suspended solids control and reuse of some wastes, but there are large amounts of chlorides being discharged which may be recycled for process reuse.

Sodium Silicate

Sodium silicate is manufactured by the reaction of soda ash or anhydrous sodium hydroxide with silica in a furnace, followed by dissolution of the product in water under pressure to prepare sodium silicate solutions. In some plants, the liquid silicate solutions are then further reacted with sodium hydroxide to manufacture metasilicates which are then isolated by evaporation and sold. Figure 54 shows the total system diagram for plant 072.

The raw waste loads for plant 072 are listed below. These wastes consist mostly of sodium silicate and unreacted silica:

Waste Products	Process Source	Avg. kg/kkg of Dry Basis Product (lb/ton)
Sodium Silicate	Scrubbers	37 (74)
Silica	Scrubbers	2.85 (5.7)
NaOH/Silicates	Washdowns	0.39 (0.78)

Data on in-plant water use could not be obtained from plant 072. However, the water use data from another plant (134) is given below on the basis of unit weight of product (dry basis). The water intake is 2,900 l/kkg (710 gal/ton) which is used as follows:

Water Use	l/kkg (gal/ton)
Process water	1,020 (245)
Boiler blow-down, Compressor cooling, Wash-down, Tank cleaning, and misc.	610 (147)
Steam, Evaporation, and other losses	1,330 (319)

At plant 072 all scrubber and washdown waters are sent to a totally enclosed evaporation pond. There is no plant effluent.

Sodium Sulfite

Sodium sulfite is manufactured by reaction of sulfur dioxide with soda ash. The crude sulfite formed in this reaction is then purified, filtered to remove insolubles from the purification

5737

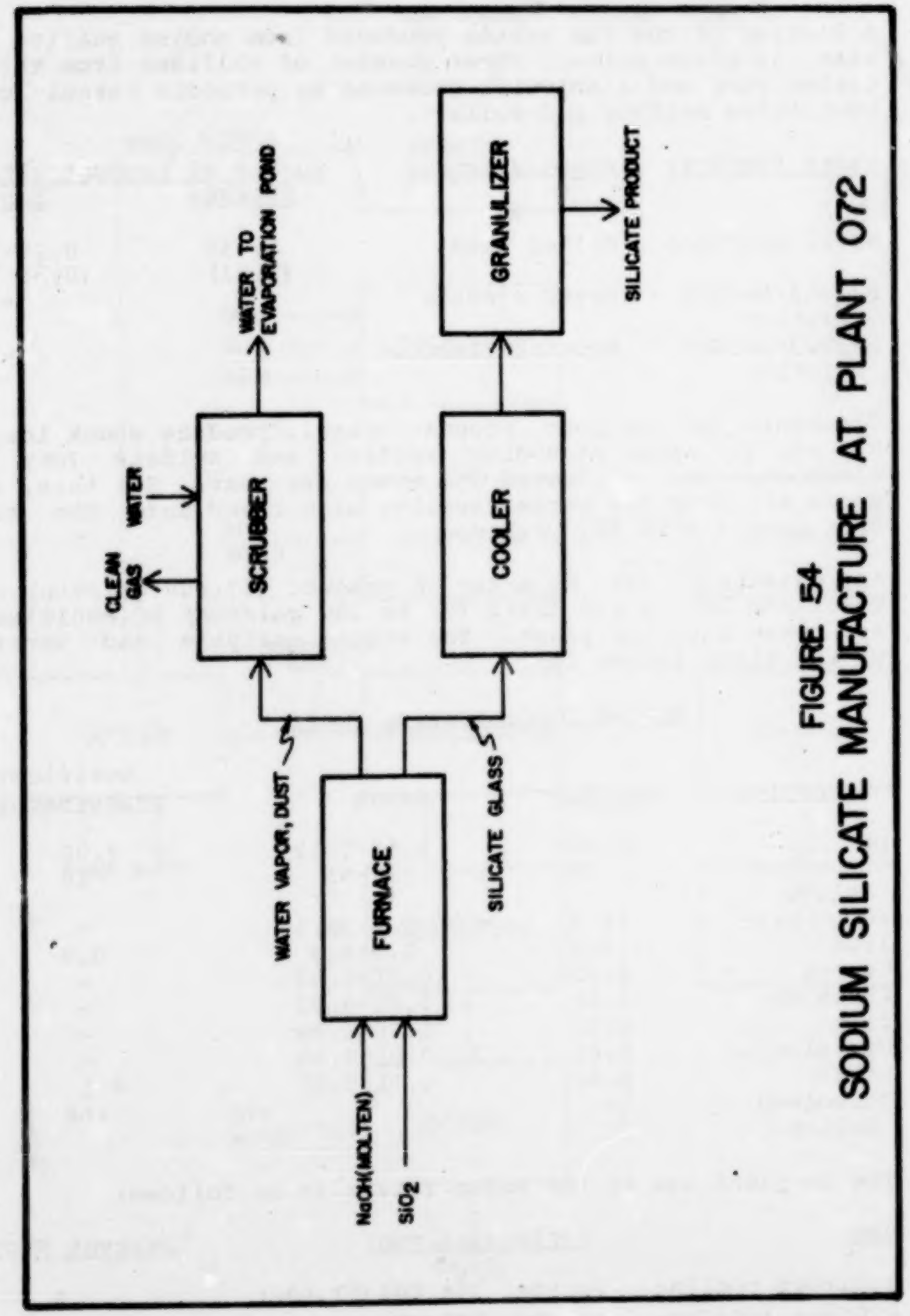

FIGURE 54
SODIUM SILICATE MANUFACTURE AT PLANT 072

5738

step, crystallized, dried and shipped. A process diagram for plant 168 is given in Figure 55.

A listing of the raw wastes produced from sodium sulfite production is given below. These consist of sulfides from the purification step and a solution produced by periodic vessel cleanouts containing sulfite and sulfate.

Waste Products	Process Source	kg/kkg of Product (lb/ton) Average	Range
Metal sulfides	Filter wash	0.755 (1.51)	0.19-1.44 (0.38-2.88)
Na_2SO_3/Na_2SO_4 solution	Dryer ejector	-	-
Na_2SO_3/Na_2SO_4 solution	Process cleanout	-	-

Cleanouts of various process vessels produce shock loads up to 9.1 kkg (10 tons) of sodium sulfite and sulfate (dry basis). Cleanouts are conducted 3-6 times per year. For this, separate tanks are used for surge capacity with bleed into the treatment unit over a 5-10 day period.

Approximately 244 cu m/kkg of product (57,600 gal/ton) of river water and 290 to 630 l/kkg (70 to 150 gal/ton) of municipal water are taken into the plant. The stated analysis and verification of the river intake is:

Parameter	Stated Concentration (mg/l) Average	Range	Verification Measurement (mg/l)
pH	(6.80)	5.68-7.12	7.00
Suspended Solids	28	10-45	10
BOD	14.8	1.4-38.5	-
Iron	2.6	1.5-4.9	0.9
Copper	0.02	0.01-0.02	-
Chromium	0.01	0.01-0.02	-
Zinc	0.49	0.08-1.84	-
Nickel	0.01	0.01-0.02	-
Lead	0.02	0.01-0.07	0.1
Dissolved Solids	-	-	168

The in-plant use of the water intake is as follows:

Use	l/kkg (gal/ton)	Percent Recycle
Indirect cooling	Approx. 244,000 (57,600)	0
Process (condensate)	Approx. 170 (40)	0
Dryer, Ejector Filter Wash	290 to 630 (70 to 150)	0

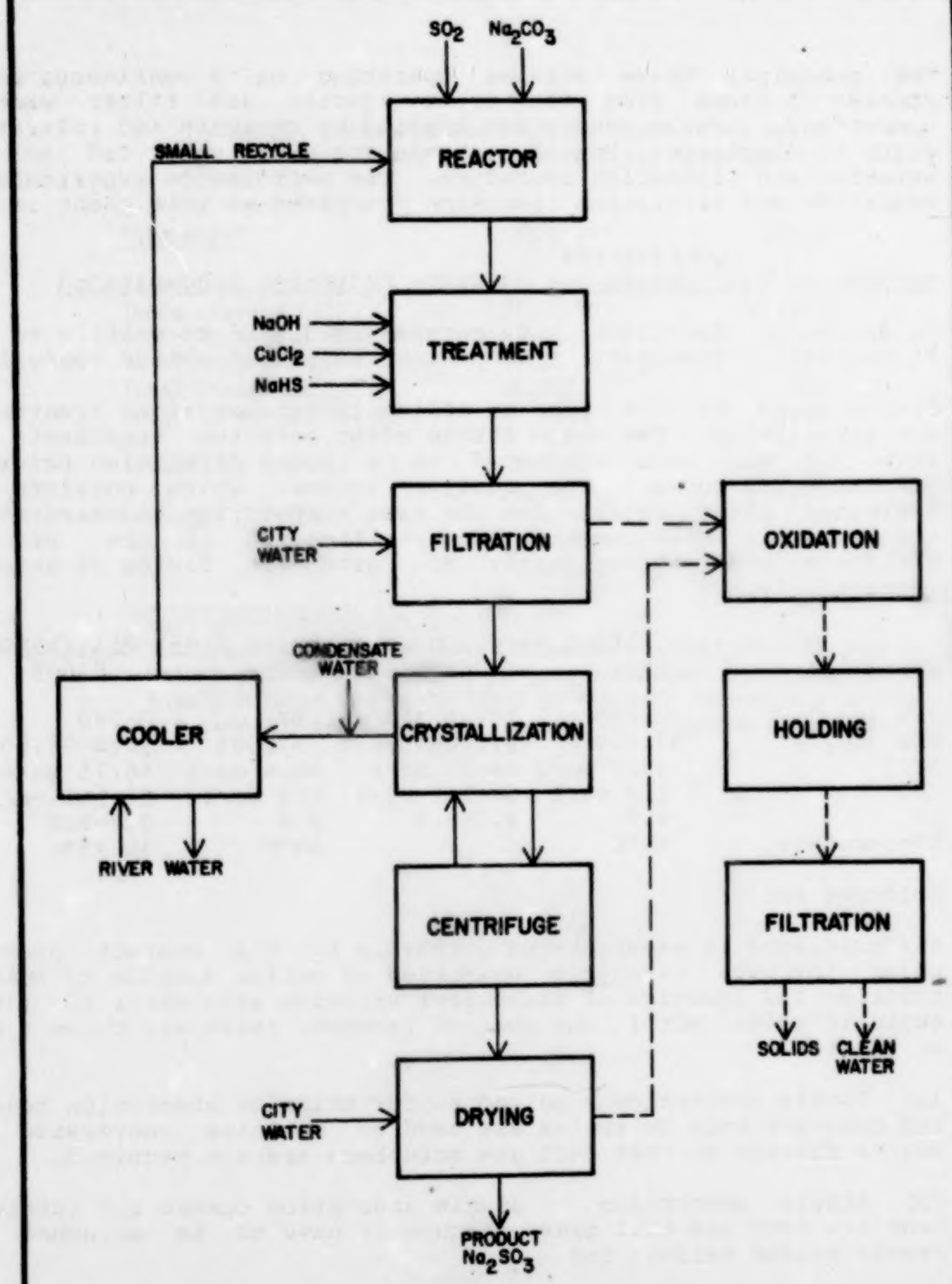

FIGURE 55
SODIUM SULFITE PROCESS FLOW DIAGRAM AT PLANT 168

The principal waste streams operating on a continuous basis consist of flows from the dryer ejector and filter washing operations. These waters are treated by aeration and filtration prior to discharge. Vessel washouts are also subjected to the aeration and filtration procedure. The performance experience of oxidation and filtration treatment processes at this plant is:

Method	Qualitative Rating	Waste Reduction Accomplished
Oxidation	Excellent	94 percent oxidation of sulfite to sulfate
Filtration	Excellent	98 percent suspended solids removal

Compositions of the process effluents streams after treatments are given below. The waste stream after aeration treatment and after it has been subjected to a final filtration prior to discharge are shown. The cooling stream, which consists of untreated river water, has the same composition as measured at the intake. Measurements for verification of the process effluents and cooling water are given in Tables 28 and 29, respectively.

Parameter	After Aeration Ave.	After Aeration Range	After Final Filtration Ave.	After Final Filtration Range
TSS (mg/l)	2,200	700-4,100	97	3-240
TDS (mg/l)	57,000	46,000-70,000	57,000	46,000-70,000
BOD5	56.8 mg/l	46-71 mg/l	56.8 mg/l	46-71 mg/l
COD	118 mg/l	64-161 mg/l	118 mg/l	64-161 mg/l
pH	9.8	9.7-9.9	9.8	9.7-9.9
Temperature	65°C	-	43°C	38-49°C

Sulfuric Acid

Sulfuric acid is manufactured primarily by the contact process which involves catalytic oxidation of sulfur dioxide to sulfur trioxide and reaction of the sulfur trioxide with water to yield sulfuric acid. Within the contact process, there are three types of plants.

(1) Double absorption - paired sulfur trioxide absorption towers and catalyst beds in series are used to maximize conversion of sulfur dioxide so that tail gas scrubbers are not required.

(2) Single absorption - single absorption towers and catalyst beds are used and tail gases frequently have to be scrubbed to remove sulfur oxides; and

TABLE 28. Measurements of Plant 168 Process Waste Streams Before and After Treatment

Parameter*		Before**	After
Flow		(Batch Process)	(Batch Process)
Temperature, °C(°F)		76.7(170)	76.7(170)
Color(Apparent) APHA Std.		500	500
Turbidity, FTU		500	380
Total Dissolved Solids		88,200	93,900
Total Suspended Solids		780	2,010
pH		11.0	11.2
Alkalinity (Total)	P	9,000	2,500
	T	24,000	4,800
Hydrogen Sulfide		0	0
Sulfite		60,000	170
COD		8,000	250

*mg/l unless otherwise specified.
**This sample was collected from the full oxidation tank just before the waste treatment process was begun. This was necessary because the waste lines to the tank are not accessible for sampling and the only outlet valve is on the tank itself.

TABLE 29. Plant 168 Cooling Water Measurements

Parameter*		Intake	Effluent
Temperature, °C		17	21
Color(Apparent) APHA Std.		95	65
Turbidity, FTU		25	15
Conductivity, as NaCl		130	120
Suspended Solids		10	8
pH		7.00	7.08
Acidity: Total		0	0
Free		0	0
Alkalinity (Total)	P	0	0
	T	40	40
Hardness: Total		73	76
Calcium		50	51
Halogens: Chlorine		24	24
Sulfate		53	55
Phosphates		0.72	0.66
Nitrate		0.33	0.32
Heavy Metals: Iron		0.86	0.78
Hydrogen Sulfide		0	0
Sodium Sulfite		3	4

*mg/l unless otherwise specified.

(3) Spent acid plants - these plants use spent sulfuric acid in place of, or in addition to, sulfur as a raw material. While the acid production parts of these plants are the same as those for single absorption, these plants are unique because of the spent acid pyrolysis units used to convert the waste sulfuric acid raw materials to a sulfur dioxide feed stream.

In this section, only the first two types of plants are considered.

Double Absorption

In the double absorption contact process, sulfur is burned to yield sulfur dioxide which is then passed through a catalytic converter with air to produce sulfur trioxide. The sulfur trioxide is then abosrbed in 95-97 percent sulfuric acid. The gases emerging from the absorber are fed to a second converter to oxidize the remaining sulfur dioxide to sulfur trioxide which is then absorbed in a second absorption tower. The tail gases are vented to the atmosphere. Figure 56 shows a detailed process flow sheet for plant 086.

At plant 086, only cooling water is discharged. In double absorption plants, the tail gases are sufficiently depleted to sulfur oxides that there is no need for gas scrubbers. Also, at this plant, use of extensive maintenance and leak prevention has been employed to prevent discharge of any product acid.

The table below shows water usage at plant 086. Most water is used for cooling. Process water is consumed to make sulfuric acid and is not discharged. The only plant effluent is the cooling water used in the heat exchangers and associated water treatment chemicals.

<u>Water Inputs to Plant</u>:

Type	cu m/day (mgd)	l/kkg (gal/ton)	Comments
River	35,200 (9.30)	55,600 (13,300)	Used for cooling only
Municipal	1,020 (0.27)	1,610 (386)	Used for process steam and cooling

<u>Water Usage</u>:

Type	Source	cu m/day(mgd)	l/kkg(gal/ton)	Percent Recycled
Cooling	River	35,200 (9.30)	55,600 (13,300)	0
	Municipal	295 (0.078)	463 (111)	0
Process	Municipal	117 (0.031)	184 (44)	0
Steam	Municipal	610 (0.161)	960 (230)	0

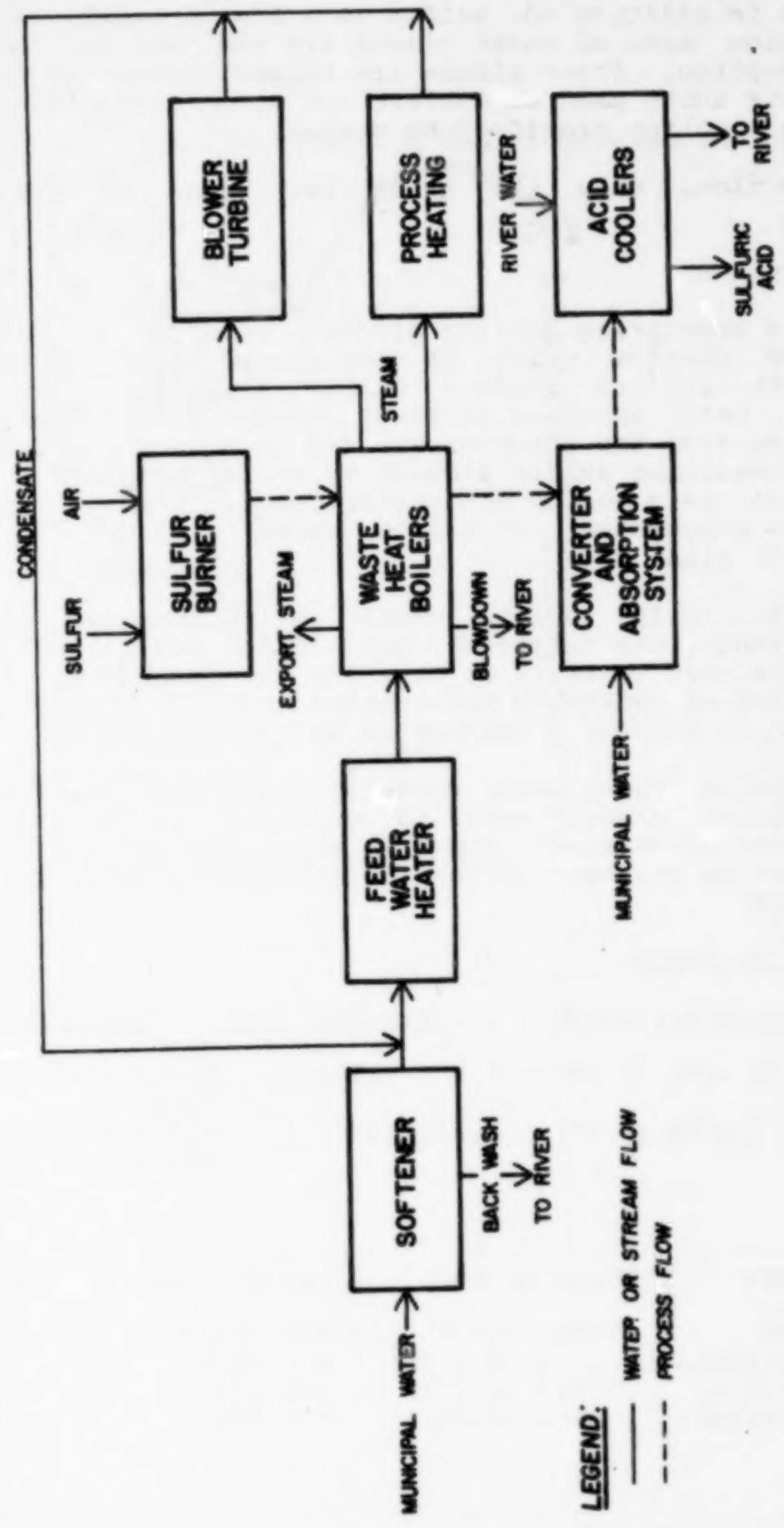

FIGURE 56
DOUBLE ABSORPTION CONTACT SULFURIC ACID PROCESS
FLOW DIAGRAM AT PLANT 086

The only effluent from this facility is once-through cooling water. Table 30 shows verification measurements for the water intake and effluent.

Single Absorption

The single absorption process differs from that previously described only in the arrangement of converters and absorbers. The rest of the process is the same. For the single absorption process, the sulfur dioxide is passed through one or more converters and then into one or more absorbers prior to venting to the atmosphere. This arrangement is less effective for both conversion of sulfur dioxide to sulfur trioxide and for absorption of the sulfur trioxide into the absorber sulfuric acid. As a result, the tail gases may have to be scrubbed, creating a waterborne waste not present for double absorption plants. The exemplary plant is plant 141.

For the single absorption sulfur-burning process, there are no wastes from the sulfuric acid process itself. Wastes arise from the use of water treatment chemicals. The raw wastes are iron, silicon, calcium and magnesium salts from water treatment. This does not cover spent acid plants based on single absorption.

Most of the cooling water used at this plant is recycled and only 5 percent emerges from the plant. This is sent to evaporation ponds, from which there is no discharge. The water input is well water in the quantity of 606 cu m/day (0.160 mgd) or 1,670 l/kkg of product (400 gal/ton). This water is used as follows:

Type	cu m/day (mgd)	l/kkg (gal/ton)	Recycled
Cooling	560 (0.148)	1,540 (370)	95
Process	45.5 (0.012)	125 (30)	0

All waterborne wastes are sent to an evaporation pond. There is no discharge. Table 31 shows verification measurements on the intake water, the effluent going to the evaporation pond, and the evaporation pond water, respectively.

Titanium Dioxide

a) Chloride process

Virtually the same process is used at the two chloride process facilities studied (plants 009 and 160). The only process differences lie in the types of ore used. Plant 160 employs a unique process using an ore containing 66 percent titanium dioxide, while plant 009 uses only 95 percent plus grades of rutile and upgraded ilmenite. Figure 57 and 58 show the process flows within the 009 facility.

TABLE 30. Intake and Effluent Measurements at Plant 086

Parameter*	Intake	Effluent
Flow cu m/day (MGD)	Not Measured	11,350 (3.0)
Temperature, °C	13	26.5
Color (apparent - APHA std.)	40	40
Turbidity (FTU)	10	15
Conductivity (as NaCl)	17,500	18,000
Suspended Solids	10	5
pH	7.5	7.43
Acidity: Total	-	-
Free	-	-
Alkalinity: (Total) P($CaCO_3$)	0	0
T(")	93	91
Hardness: Total($CaCO_3$)	3,300	3,200
Calcium($CaCO_3$)	600	590
Halogens: Chlorine	-	-
Chloride	10,000	10,000
Fluoride	-	-
Sulfate	1,500	1,500
Phosphates (Ortho)	0.70	0.68
Nitrate, N	0.24	0.26
Heavy Metals: Iron	0.28	0.32
Chromate	-	-
Oxygen (Dissolved)	-	-
Sulfite	1	1
COD	-	-

*All units mg/l unless otherwise specified.

TABLE 31. In-Plant Water Streams at Plant 141

Parameter*	Well Intake Water	Sump to Ponds	Evaporation Pond
Flow	Unable to measure	-	-
Temperature (°C)	19	24.6	17.5
Color (Apparent-APHA)	100	0	35
Turbidity (FTU)	35	10	10
Conductivity (as NaCl)	410	360	790
Suspended Solids	40	4700	0
pH	7.0	8.5	7.7
Acidity: Total	0	0	0
Free	0	0	0
Alkalinity (Total) P	0	0	0
T	475	120	105
Hardness: Total	410	250	500
Calcium	275	112	400
Halogens: Chlorine	0	0	0
Chloride	18.5	20	22.5
Fluoride	0.35	0.6	0.77
Sulfate	78	340	680
Phosphates (Total)	1.6	0.64	0.12
Nitrogen (Total)	0.03	0.18	0
Heavy Metals: Iron	18	9	4
Chromate	0	0.16	0.03
Oxygen (Dissolved)	5.3	5.5	7.9
COD	25	575	70

*All units mg/l unless otherwise specified.

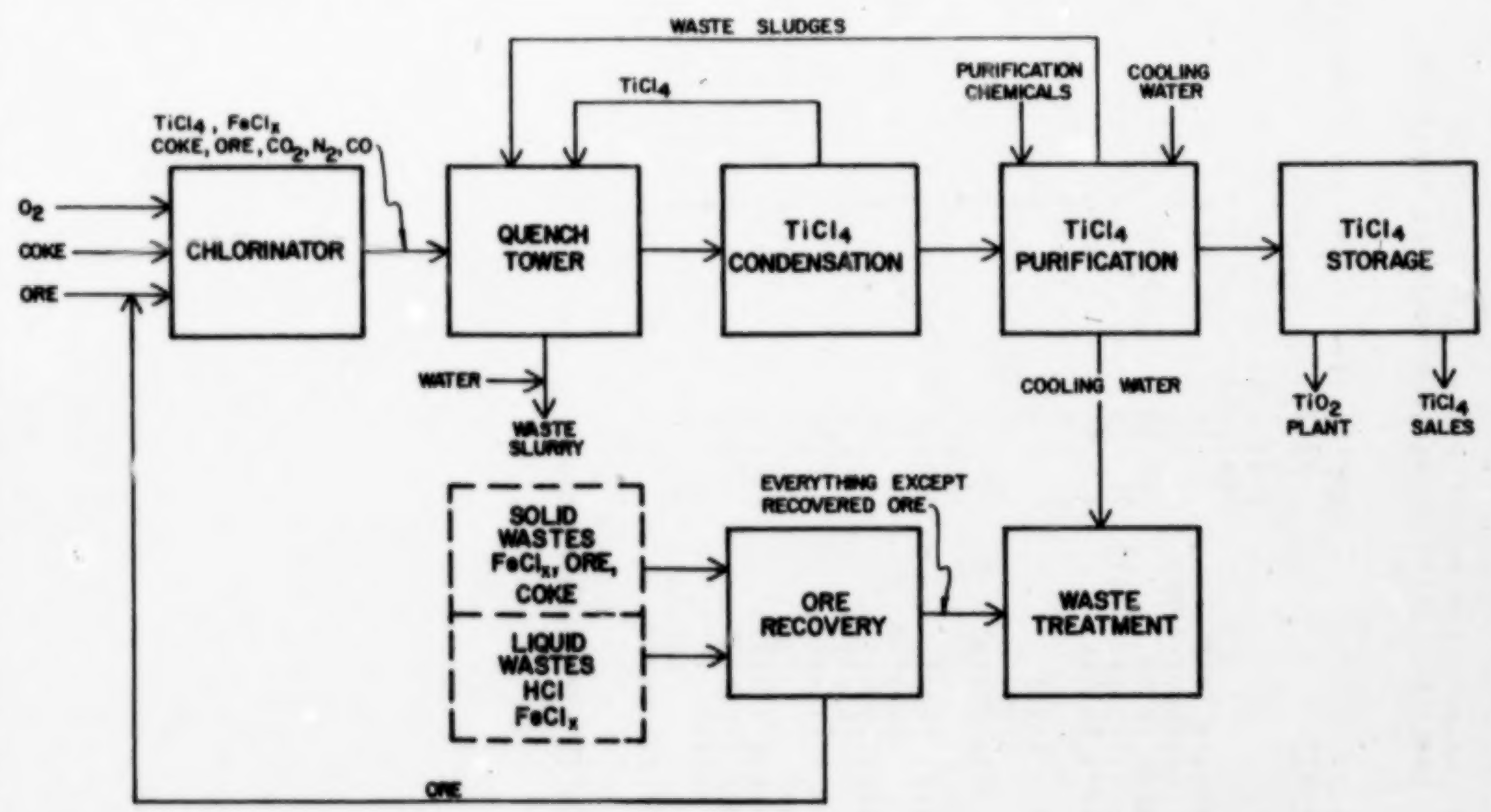

FIGURE 57
TITANIUM TETRACHLORIDE PORTION OF TITANIUM DIOXIDE PLANT

5749

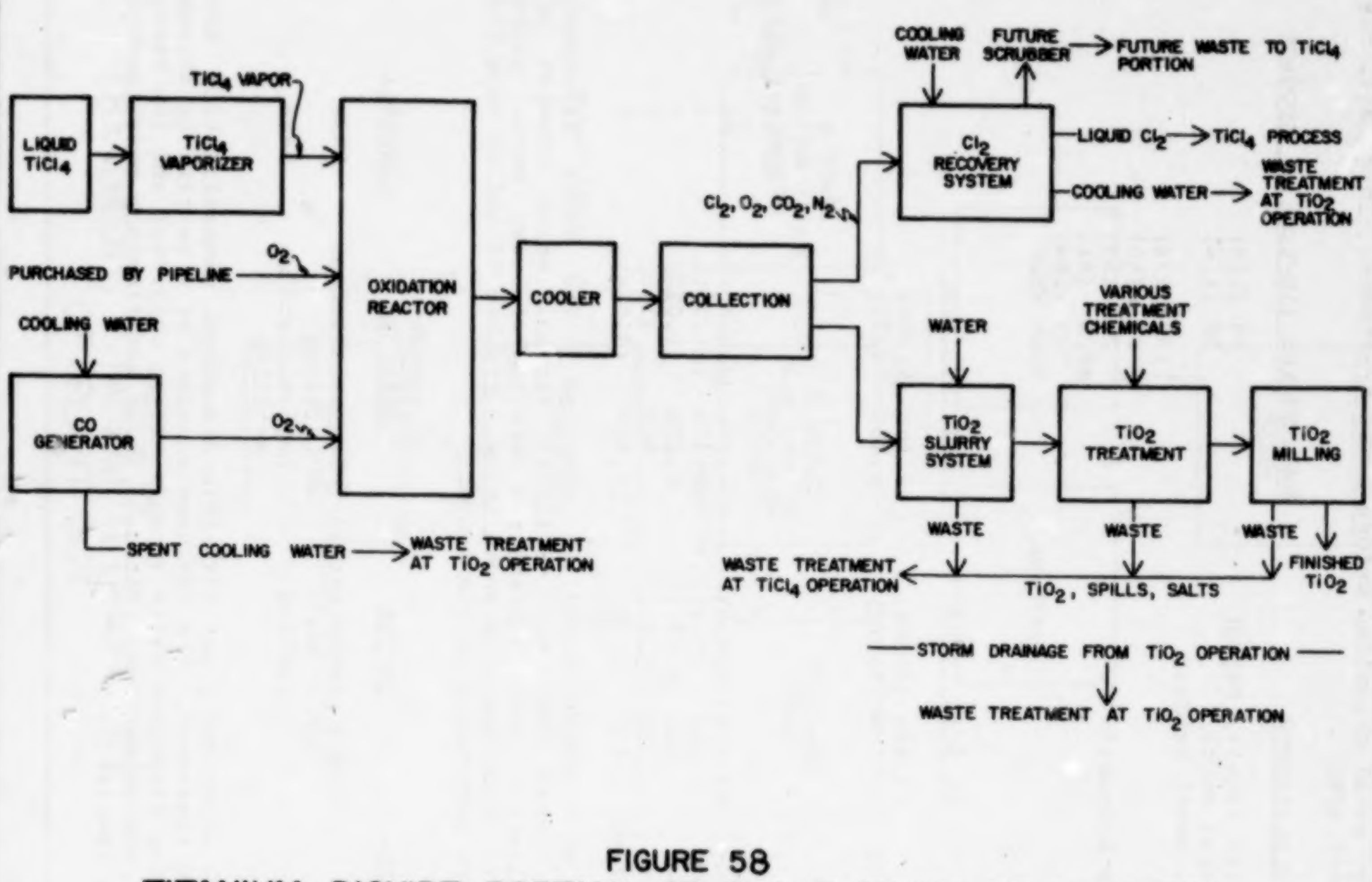

FIGURE 58
TITANIUM DIOXIDE PORTION OF PLANT (CHLORIDE PROCESS)

5750

The raw wastes from plant 009 consist of heavy metal salts, waste coke and hydrochloric acid. In the raw waste stream, these are actually metal chlorides before waste treatment. In detail, the raw wastes are:

Constituents	Ave. kg/kkg (lb/ton) of product
Iron salts (equiv. Fe_2O_3)	58 (116)
Other metal salts (equiv. metal oxides)	58 (116)
Ore	138 (276)
Coke	23 (46)
Titanium hydroxide	29 (58)
TiO_2	40.5 (81)
HCl	227 (454)

Input:

	cu m/day (mgd)	l/kkg (gal/ton)
Lake	11,500 (0.304)	17,100 (4,100)
Municipal	76 (0.020)	1,130 (270)

Use:

					Percent Recycled
Cooling	58,700	(15.5)	876,000	(210,000)	93
Process	6,060	(1.6)	90,500	(21,700)	0
Cleanup	284	(0.075)	4,220	(1,010)	0
Sanitary	38	(0.01)	560	(140)	0
Boiler feed	834	(0.22)	12,500	(3,000)	0

Most of the cooling water is recycled. The waste treatment methods used on the effluent stream, which consist of neutralization, precipitation and settling of heavy metal salts prior to discharge, are shown below. Figures 59 and 60 show the treatment processing at plant 009.

Stream No.	Source	Treatment Methods	Disposal
1	TiCl4 precipitation	Neutralization, settling	Lake
2	Cooling	Neutralization, settling	Lake

Table 32 shows the plant 009 effluents after neutralization and settling treatment. The effluent consists of a neutral pH stream containing dissolved salts (mostly sodium chloride) and low heavy metals concentrations. Table 33 shows verification measurements at this facility.

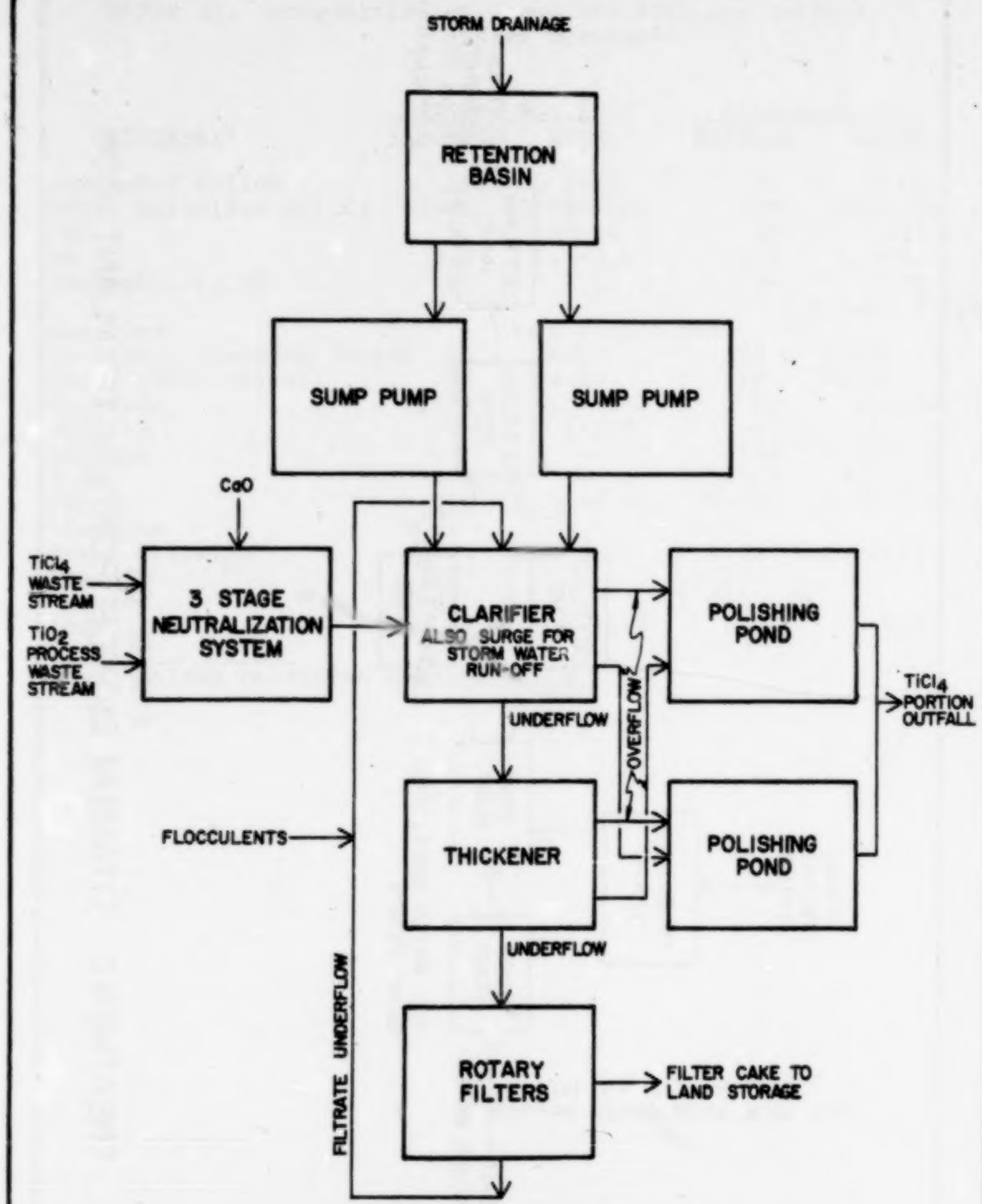

FIGURE 59
TREATMENT, TITANIUM TETRACHLORIDE OF PLANT 009

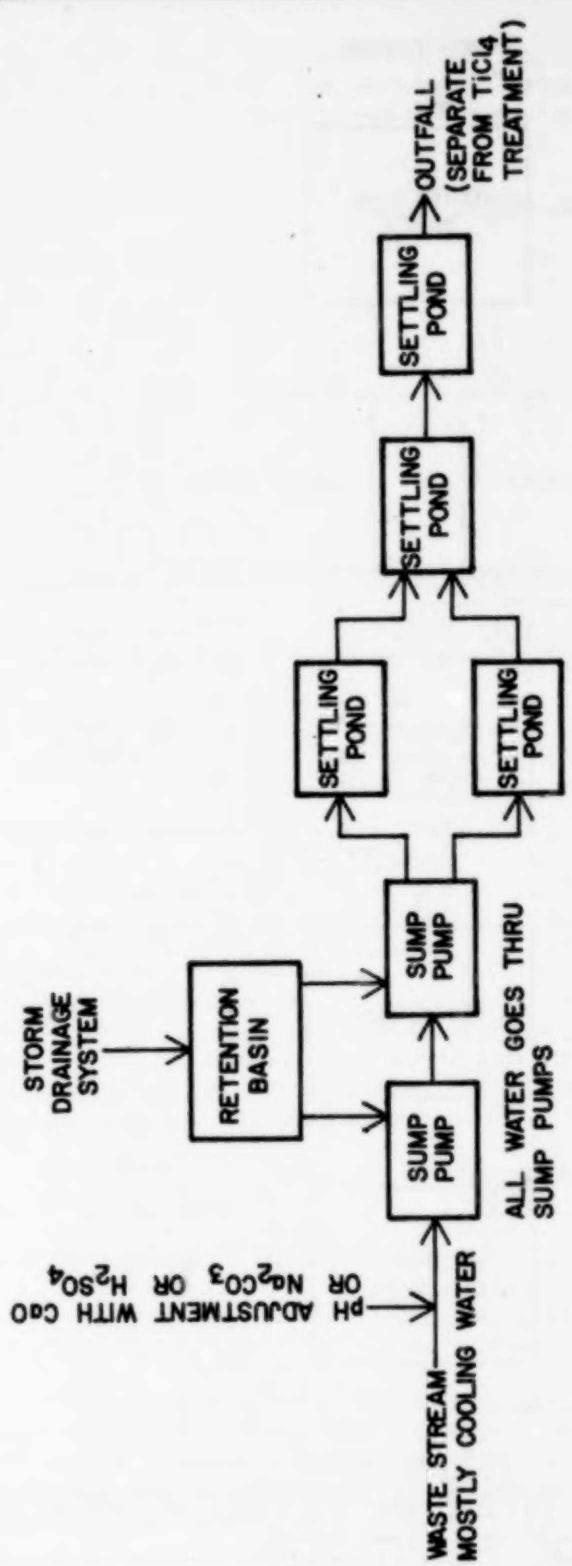

FIGURE 60

TREATMENT, TITANIUM DIOXIDE PORTION OF PLANT 009

TABLE 32. Composition of Plant 009 Effluent Streams After Treatment

Parameter*	Stream No. 1 Average	Stream No. 1 Range	Stream No. 2 Average	Stream No. 2 Range
Suspended Solids	18	1-50	15	0-40
Total Dissolved Solids	3300	1500-4500	300	180-900
COD	50	40-90	20	5-45
pH	7.8	6.0-9.0	6.8	6.0-9.0
Temperature, °C	16	7-27	16	2-32 (Ambient Temp.)
Organics	None were found			
Turbidity (Jackson Units)	20	10-80	20	10-50
Color (APHA Units)	10	10-20	10	10-20
Chloride	1650	750-2050	50	70-100
Sulfate	--	1-2.5	--	1-2.5
Sulfate	--	--	150	90-450
Iron	0.2	0-3.0	0.2	0.1-1.0
Copper	0.015	0.01-0.03	0.015	0.01-0.03
Chromate	0.01		0.01	
Total Chromium	0.05	0.01-0.15	0.05	0.01-0.15
Arsenic	0.02		0.02	
Mercury	0.001		0.001	
Lead	0.14	0.1-0.19	0.02	0.02

*mg/l unless otherwise specified

TABLE 33. Verification Data of Plant 009

Parameter*		Lake Intake Water	Effluent Stream #1	Effluent Stream #2
Flow, cu m/day (MGD)		3650 (0.964)	6060 (1.60)	2240 (0.590)
Temperature, °C		9	16	26.5
Color (APHA Units)		100	140	90
Turbidity (FTU)		35	35	30
Conductivity		100 (NaCl)	2100 (NaCl)	170 (NaCl)
Suspended Solids		25.0	10	30
pH		7.9	7.6	6.85
Acidity: Total		N/A	N/A	0 ($CaCO_3$)
Free		N/A	N/A	0 ($CaCO_3$)
Alkalinity (Total)	P	0 ($CaCO_3$)	0 ($CaCO_3$)	0 ($CaCO_3$)
	T	93 ($CaCO_3$)	22 ($CaCO_3$)	28 ($CaCO_3$)
Hardness: Total		129 ($CaCO_3$)	2600 ($CaCO_3$)	185 ($CaCO_3$)
Calcium		97 ($CaCO_3$)	1920 ($CaCO_3$)	139 ($CaCO_3$)
Halogens: Chlorine		0	0	0
Chloride		36.5	2250	49.5
Fluoride		0	0.3	0.25
Sulfate		32.0	240	175
Phosphates (Total)		1.4	0.025	0.225
Nitrogen (Total)		0.24	0.14	1.3
Heavy Metals:				
Iron		0.225	1.6	0.4
Chromate		0 (Cr+6)	0 (Cr+6)	0 (Cr+6)
Oxygen (Dissolved)		10.8	9.0	6.2

*mg/l unless otherwise specified

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b) Sulfate process

For the sulfate process, we have examined information on all the existing facilities in the United States. The following description lists the raw wastes and waste segregation practices normally used by the industry and describes planned improved treatments.

In the sulfate process, ground ilmenite ore is digested with concentrated sulfuric acid at relatively high temperature. The acid used is normally about 150 percent of the weight of the ore. In some cases, small amounts of antimony trioxide are also added. The resulting sulfates of titanium and iron are then leached from the reaction mass with water, and any ferric salts present are then reduced to ferrous by treatment with iron scrap to prevent coloration of the final titanium dioxide product.

After these operations, the resulting solutions are clarified, cooled and sent to a vacuum crystallizer. There, ferrous sulfate crystallizes out and is then separated from the mother liquor by centrifugation. This material is either sold or disposed of as a solid waste.

The mother liquor is then clarified by filtration after addition of filter aid and is further concentrated by vacuum evaporation. Seed crystals or other nucleating agents are added, and the concentrated liquor is then treated with steam to hydrolyze the titanyl sufate present. The resulting precipitate is collected by filtration, washed several times and then calcined to yield titanium dioxide. The calcined product is ground, quenched and dispersed in water. The coarse products are separated in a thickener to which caustic soda is added to maintain a constant pH. These coarse particles are reground and further processed to yield a purer product.

Table 34 gives a generalized listing of the raw wastes from titanium dioxide manufacture by the sulfate process. Data in this table are in a form applicable to the effluent from any of the five existing sulfate process plants. Each of these five facilities have slightly different raw wastes due to differences in compositions of the raw ores. Table 35 lists typical ores used in U.S. manufacture of titania, with the Adirondack and Austrailian Ilmenites being typical of ores used with the sulfate process.

Discussion of water use and treatment will be based on one facility, chosen from the five plants. The specific facility used for this modeling discussion is plant 122. A general waste treatment flow chart for this facility is presented in Figure 61 and generalized water usage is:

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TABLE 34. Sulfate Process Waste Streams -- Titanium Dioxide Manufacture

1. Dissolving and Filtration	Ore and scrap iron plus flocculants	0.07 x total ore and scrap iron discharged
	H_2SO_4	0.0016 x ore
	Organic Carbon	0.0004 x ore plus 0.1 x C in ore
2. Copperas (if produced)	$FeSO_4 \cdot 7H_2O$ (as Fe)	(Fe^{+2} + 1.50 Fe^{+3}) in ore minus 0.33 x TiO_2 in ore
	Total Sulfate	1.76 x iron in copperas
3. Strong Acid	$FeSO_4$ (as Fe)	0.67 x (iron in ore minus iron in copperas)
	H_2SO_4	1.07 x ore
	Other ore impurities	0.67 x impurities in ore
	TiO_2	0.03 x TiO_2 in ore
	Organic Carbon	0.0022 x ore plus 0.81 x C in ore
4. Weak Acid	$FeSO_4$ (as Fe)	0.33 x (iron in ore minus iron in copperas)
	H_2SO_4 (Total)	0.53 x ore plus 0.25 x TiO_2 in ore
	Other ore impurities	0.33 x impurities in ore
	TiO_2	0.02 x TiO_2 in ore
	Organic Carbon	0.00025 x ore plus 0.09 x C in ore
5. Vent and Kiln Scrubbing	H_2SO_4	0.01 in ore
6. TiO_2 Losses	TiO_2	0.016 x TiO_2 in ore
	Na_2SO_4	0.03 x TiO_2 in ore

Note: Effluents also contain traces of Pb and Cu from process equipment. Silica and zircon do not react and are discharged with the sludge.

TABLE 35. Typical Ore Analyses* - Titanium Dioxide Manufacture

Constituent (Wt. %)	Adirondack	Australian Ilmenite	Florida Ilmenite	Australian Rutile	Slag
TiO_2	44.5	55.4	64.0	96.3	71.0
FeO	38.0	23.8	3.2		10.9
Fe_2O_3	5.8	16.9	26.9	0.28	
P_2O_5	0.04	0.08	0.21	0.03	0.01
V_2O_5	0.14	0.17	0.13	0.56	0.5
Al_2O_3	1.79	0.94	1.5	0.39	5.7
CaO	0.58	0.02	0.13	0.01	1.0
MgO	2.14	0.27	0.35	0.05	5.0
SiO_2	2.48	0.15	0.3	0.28	5.0
MnO	0.50	0.72	1.35	0.01	0.3
S	0.17	0.01	0.09		0.09
Co	0.02	0.11			
Cr_2O_3	0.01	0.14	0.10	0.20	0.2
ZrO_2			0.07	0.6	
Fe					0.5
C			0.27		
NbO_2			0.11	0.30	
H			0.27	0.02	

*Blank spaces indicate low impurity level or absence of reliable analytical data. Data from reference 14.

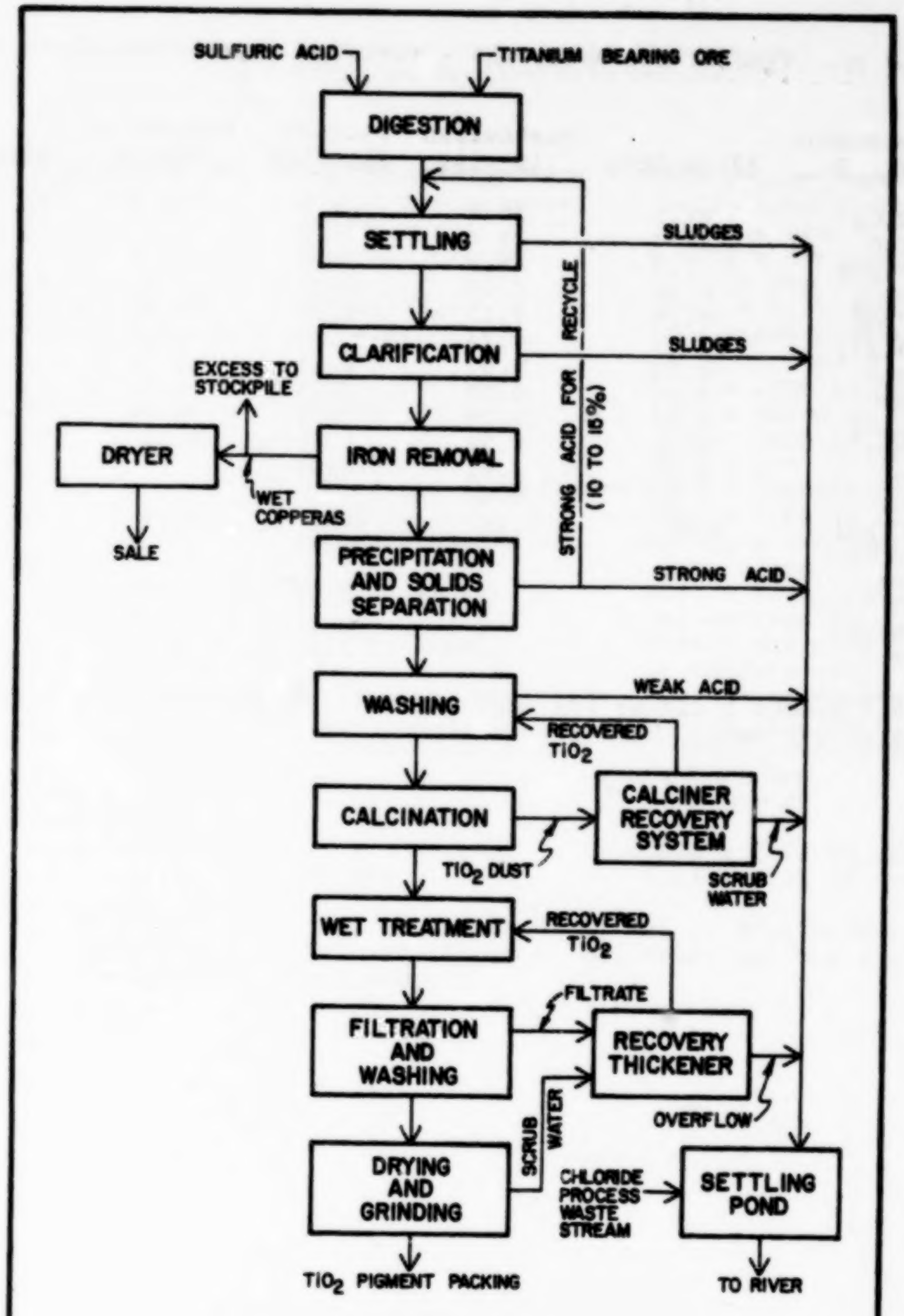

FIGURE 61
SULFATE PROCESS FLOW DIAGRAM
AT PLANT 122

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Type	cu m/kkg of Product (gal/ton)		Recycle
Cooling	284 (68,000)	brackish	0 percent
Cooling	83.6 (20,000)	fresh	90 percent
Process	100 (24,000)		2 percent
Boiler feed	16.7 (4,000)		30 percent

Currently, all of the process water used is fed to a settling pond to remove suspended materials and is then discharged. The process water discharged is from two streams, one from a solids separation part of the process which contains strong (18-22 percent) acid and a second weak acid stream coming from other parts of the process. Both streams are currently mixed before treatment.

In the treatment of wastes, the best approach would be to segregate these two streams and attempt to recover acid values and/or ferrous sulfate from the more acidic stream, while applying neutralization procedures to the other. Considering the strong acid stream first, a possible recovery treatment is first to partially evaporate the waste to effect further precipitation of ferrous sulfate and other metal salts which could be recovered by filtration after cooling. The remaining solution could be further concentrated for other use or recycled to the process.

The weak acid stream, which does not contain sufficient metal or acid values to justify recovery, would be oxidized to convert ferrous salts to the ferric state and then treated with lime to precipitate heavy metals and adjust for pH to contain about 2000 mg/l dissolved $CaCO_3$.

One advantage to this scheme is the possibility of further processing the heavy metal salts recovered by acid concentration. These could possibly be further processed to recover vanadium values, among others. It may be noted that the above-mentioned scheme is a combination of two treatment approaches. The method involving total neutralization and settling is currently being installed at the plant 122 to treat all of the waste streams. Table 36 lists some information on this treatment process.

Effluents from four titanium dioxide sulfate process facilities are listed in Table 37. None of these have discharge pH's in the 6.0-9.0 range for all streams, and all contain 3000 mg/l dissolved solids. In some cases, strong acid streams are currently segregated and this material, in one case, is disposed of by ocean dumping. The neutralization procedure, along with a possible scheme for some acid recovery was discussed earlier in this section.

For the sulfate process, an alternate treatment may consist of raw ore enrichment to remove much of the iron present before the raw material is used in the process. One such potential process

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TABLE 36 . Future Treatment at Plant 122

Methods	Estimated Installation Time	Estimated Performance
Neutralization of acid to $CaSO_4$ and oxidation of iron, and remove for sale or stockpile (as ferrous sulfate) of process wastes and cooling water	22 mos	Reduce C.O.D to Nil Reduce acidity to Nil Reduce Fe, Mn, V, and Cr to Nil TDS 50 mg/l
Additional settling ponds for cooling waters	22 mos	Reduction of suspended solids formed due to neutralization by 95%

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TABLE 37 . Partial Discharge Data from TiO_2 Sulfate Plants(1)

	Plant 142 Streams (2)		Plant 046 Streams (3)			Plant 122 Streams			Plant 008
Paramater*	No.1	No.2	No. 1	No. 2	No. 3	No. 1	No. 2	No. 3	No. 1
BOD_5	10	3	6	3	--	--	0.3	0.5	--
COD	71	145	--	--	--	287	42	27	--
pH	8.0	1.2	6.5	5.6	--	1.0	2.6	5.0	5 min
Alkalinity	220	--	--	--	--	--	--	--	--
Total Dissolved Solids	1660	22,371	15,316	21,300	14,000	15,400	3,000	2,700	5,000
Iron	0.02	823	0.5	1.7	31,000	1,060	45	15	100
Sulfate	1,170	12,377	1,617	1,378	131,000	6,800	187	125	--
Chloride	51.5	105	6,394	7,900	--	625	2,480	2,830	--
Acidity	--	11,435	36	--	--	20,000	160	1000	--
Flow, cu m/day	10,200	Combined	20,000	123,400	6,100	20,000	40,900	30,300	
(MGD)	(2.7)	--	(5.5)	(32.6)	(1.6)	(5.5)	(10.8)	(8.0)	

(1) One plant of one manufacturer is not listed here. Data on titanium dioxid and chromate concentrations were provided.

(2) The corporation owning this facility is currently developing a process for recovery and recycle of the sulfuric acid used. This process is still under testing on the pilot plant scale.

(3) This plant barges its strong acid wastes out to sea for disposal. This method of disposal of highly acid wastes containing large amounts of dissolved heavy metals is not considered satisfactory. Effluent No. 3 is the available data on material dumped at sea.

*mg/l unless otherwise specified

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under development at the U.S. Bureau of Mines Reno Research Center involves the smelting of ilmenite ($FeTiO_3$) with coal and sodium borate-titanate slag which contains 40 weight percent titanium dioxide and 0.2 weight percent iron. Over 99 percent of the titanium in the ore is recovered in the slag, while about 90 percent of the iron present is converted to the elemental form. After separation of the iron from the slag, air or oxygen is blown into the molten slag to oxidize the titanium to the tetravalent form which is readily soluble in acid. The molten slag is water quenched and leached in hot water to yield a sodium titanate residue (70 - 90 weight percent TiO_2) in a sodium borate solution. The recovered titanate can then be used in the sulfate process.

Sodium borate in solution is recovered by crystallization and can be recycled to the smelting step. Use of this procedure to provide a sodium titanate feed for the sulfate process eliminates the generation of large amounts of iron sulfate and the inherent problems related to its disposal.

Other methods of ore enrichment under development have been alluded to by the various sulfate process titanium dioxide producers, but details have not been made available.

Substitution of sodium titanate for ilmenite as a sulfate process raw material would lead to a sulfate - bisulfate by-product which could be recovered by crystallization (as is done with ferrous sulfate) for sale. This would eliminate much of the heavy metal salt discharge problems with the sulfate process and also solve the problem of acidic discharges via recovery of a low grade sodium bisulfate by-product for sale or other use.

This approach may prove to be a superior approach to either the neutralization scheme or the acid recovery techniques mentioned earlier. The economics of the above mentioned possible sulfate process modification have not yet been reported. A more detailed evaluation of this possible process must await such an economic presentation.

VERIFICATION SAMPLING AND ANALYTICAL METHODS

Sampling Operations

Two teams of two men each were assigned to the field sampling and measurements operations. Each of the teams was equipped with a station wagon and a 4.7-meter trailer outfitted as a mobile water testing laboratory. The visit of a team to each facility was preceded by a visit to the plant by one of the senior engineers on the project team. During this visit, effluent streams and potential sampling sites were determined and approximate expected stream compositions were established.

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The duties of the field team visiting the plant included measurement of flow rate and collection of samples at each designated sampling site. Methods used to determine flow rates varied from stream to stream, but included: (1) Use of existing weirs or installed flow meters; (2) Use of current meter plus dimensional measurements; (3) Direct collection of small outfall streams, with volumetric measurement related to duration of collection; (4) Use of dye tracer to give velocity measurement (plus dimensional measurements).

Since many of the streams of interest could not be approached, the wastes contained therein were sampled after having mixed with one or more other streams.

For most effluent sampling sites, four one-liter samples were taken (one per hour) over a four-hour duration. These samples were then mixed to give a four-liter composite sample. One four-liter grab sample was taken of the water supply to the plant. At the end of the day, a four-liter grab sample was taken at each sampling site (and of the water supply) for backup.

One-half of the four-liter composite sample was used for analyses and tests in the field laboratory. The remaining two liters of composite sample were divided into several samples, some of which were acid-stabilized and transported to an analytical lab for further testing. The sample was split with the plant where it was collected when requested by plant personnel.

The results obtained by the use of the field transportable test methods were, in general, quite reliable. As a routine matter, however, standard test samples were inserted into the analytical program to allow some estimate of the validity of the results reported from the field. The unlabeled standard samples were made up from EPA Reference Samples and presented to the analytical personnel without obvious identification.

The analysis of the samples from various process and discharge streams has been a somewhat complex procedure. This is due, primarily, to the extraordinary variation in flow rates, concentration of solutes and (in particular) the extremely wide range of suspended solids which was encountered.

Pretreatments in the field for the various types of samples were:

(1) Suspended and dissolved solids - none;
(2) Metal ion analysis - addition of 5 ml of concentrated nitric acid per liter of sample;
(3) COD analysis - used immediately in the dichromate reflux apparatus or treated with 1.0 N sulfuric acid;
(4) Nitrogen analysis - used immediately or treated with mercuric chloride for stabilization;

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(5) Phosphorus - addition of 40 mg. of mercuric chloride per liter; and
(6) Fluoride - none.

The analytical methods used are those described in EPA's Methods for Chemical Analysis of Water and Wastes, 1971.

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SECTION VI

SELECTION OF POLLUTANT PARAMETERS

The waste water characterization detailed in the previous Section has been reviewed to determine what waste water constituents are present in significant quantities from the various product subcategories. The criterion used in the selection of pollutant parameters for each subcategory include:

a) Sufficient data is available with regard to the quantities of a pollutant in the raw waste load as well as its treatability by various waste water treatment systems.
b) The pollutant is generally present in the raw waste load in quantities sufficient to cause deletrious effects on the environment.
c) There is demonstrated technology to practicably and economically reduce the concentration of the pollutant.

The following is a discussion of those pollutant parameters which have been selected as the subject of effluent limitations. They have only been selected for those chemical subcategories in which they are generally present in significant quantities.

pH

The term pH is a logarithmic expression of the concentration of hydrogen ions. At a pH of 7, the hydrogen and hydroxyl ion concentrations are essentially equal and the water is neutral. Lower pH values indicate acidity while higher values indicate alkalinity. The relationship between pH and acidity or alkalinity is not necessarily linear or direct.

Waters with a pH below 6.0 are corrosive to water works structures, distribution lines, and household plumbing fixtures and can thus add such constituents to drinking water as iron, copper, zinc, cadmium and lead. The hydrogen ion concentration can affect the "taste" of the water. At a low pH water tastes "sour". The bactericidal effect of chlorine is weakened as the pH increases, and it is advantageous to keep the pH close to 7. This is very significant for providing safe drinking water.

Extremes of pH or rapid pH changes can exert stress conditions or kill aquatic life outright. Dead fish, associated algal blooms, and foul stenches are aesthetic liabilities of any waterway. Even moderate changes from "acceptable" criteria limits of pH are deleterious to some species. The relative toxicity to aquatic life of many materials is increased by changes in the water pH. Metalocyanide complexes can increase a thousand-fold in toxicity with a drop of 1.5 pH units. The availability of many nutrient

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substances varies with the alkalinity and acidity. Ammonia is more lethal with a higher pH.

The lacrimal fluid of the human eye has a pH of approximately 7.0 and a deviation of 0.1 pH unit from the norm may result in eye irritation for the swimmer. Appreciable irritation will cause severe pain.

Total Suspended Solids

Suspended solids include both organic and inorganic materials. The inorganic components include sand, silt, and clay. The organic fraction includes such materials as grease, oil, tar, animal and vegetable fats, various fibers, sawdust, hair, and various materials from sewers. These solids may settle out rapidly and bottom deposits are often a mixture of both organic and inorganic solids. They adversely affect fisheries by covering the bottom of the stream or lake with a blanket of material that destroys the fish-food bottom fauna or the spawning ground of fish. Deposits containing organic materials may deplete bottom oxygen supplies and produce hydrogen sulfide, carbon dioxide, methane, and other noxious gases.

In raw water sources for domestic use, state and regional agencies generally specify that suspended solids in streams shall not be present in sufficient concentration to be objectionable or to interfere with normal treatment processes. Suspended solids in water may interfere with many industrial processes, and cause foaming in boilers, or encrustations on equipment exposed to water, especially as the temperature rises. Suspended solids are undesirable in water for textile industries; paper and pulp; beverages; dairy products; laundries; dyeing; photography; cooling systems, and power plants. Suspended particles also serve as a transport mechanism for pesticides and other substances which are readily sorbed into or onto clay particles.

Solids may be suspended in water for a time, and then settle to the bed of the stream or lake. These settleable solids discharged with man's wastes may be inert, slowly biodegradable materials, or rapidly decomposable substances. While in suspension, they increase the turbidity of the water, reduce light penetration and impair the photosynthetic activity of aquatic plants.

Solids in suspension are aesthetically displeasing. When they settle to form sludge deposits on the stream or lake bed, they are often much more damaging to the life in water, and they retain the capacity to displease the senses. Solids, when transformed to sludge deposits, may do a variety of damaging things, including blanketing the stream or lake bed and thereby destroying the living spaces for those benthic organisms that would otherwise occupy the habitat. When of an organic and

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therefore decomposable nature, solids use a portion or all of the dissolved oxygen available in the area. Organic materials also serve as a seemingly inexhaustible food source for sludgeworms and associated organisms.

Turbidity is principally a measure of the light absorbing properties of suspended solids. It is frequently used as a substitute method of quickly estimating the total suspended solids when the concentration is relatively low.

Cyanide

Cyanides in water derive their toxicity primarily from undissolved hydrogen cyanide (HCN) rather than from the cyanide ion (CN^-). HCN dissociates in water into H^+ and CN^- in a pH-dependent reaction. At a pH of 7 or below, less than 1 percent of the cyanide is present as CN^-; at a pH of 8, 6.7 percent; at a pH of 9, 42 percent; and at a pH of 10, 87 percent of the cyanide is dissociated. The toxicity of cyanides is also increased by increases in temperature and reductions in oxygen tensions. A temperature rise of 10°C produced a two- to three-fold increase in the rate of the lethal action of cyanide.

Cyanide has been shown to be poisonous to humans, and amounts over 18 mg/l can have adverse effects. A single dose of 6 mg/l, about 50-60 mg, is reported to be fatal.

Trout and other aquatic organisms are extremely sensitive to cyanide. Amounts as small as 0.1 mg/l can kill them. Certain metals, such as nickel, may complex with cyanide to reduce lethality especially at higher pH values, but zinc and cadmium cyanide complexes are exceedingly toxic.

When fish are poisoned by cyanide, the gills become considerably brighter in color than those of normal fish, owing to the inhibition by cyanide of the oxidase responsible for oxygen transfer from the blood to the tissues.

Chromium

Chromium, in its various valence states, is hazardous to man. It can produce lung tumors when inhaled and induces skin sensitizations. Large doses of chromates have corrosive effects on the intestinal tract and can cause inflammation of the kidneys. Levels of chromate ions that have no effect on man appear to be so low as to prohibit determination to date.

The toxicity of chromium salts toward aquatic life varies widely with the species, temperature, pH, valence of the chromium, and synergistic or antagonistic effects, especially that of hardness. Fish are relatively tolerant of chromium salts, but fish food

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organisms and other lower forms of aquatic life are extremely sensitive. Chromium also inhibits the growth of algae.

In some agricultural crops, chromium can cause reduced growth or death of the crop. Adverse effects of low concentrations of chromium on corn, tobacco and sugar beets have been documented.

Chemical Oxygen Demand

Certain waste water components are subject to aerobic biochemical degradation in the receiving stream. The chemical oxygen demand is a gross measurement of organic and inorganic material as well as other oxygen-demanding material which could be detrimental to the oxygen content of the receiving water.

Iron

The presence of iron in water causes taste and turbidity problems. It has been shown to be harmful to fish and plants in varying concentrations. Ferric hydroxide has been known to cause detrimental effects to plankton.

Lead

The presence of lead may be a problem in receiving waters. Various oysters and lobsters are known to be adversely effected when exposed to lead in concentrations less than 0.5 mg/l. Lead poisoning in humans has been reported to have been caused by drinking water containing less than 0.1 mg/l lead.

Mercury

Mercury has been shown to be deletrious to the environment in low concentrations. Many aquatic organisms are adversely affected by mercury concentrations of less than 0.01 mg/l.

Total Organic Carbon

Soluble organics may cause utilization or depletion of dissolved oxygen by the activity of aerobic bacteria. They may also impart undesirable tastes and odors to a water supply. For example, phenolics are a special nuisance in drinking water supply, particularly after chlorination, because of the very low concentrations (less than 0.002 mg/l) which result in taste and odor detection.

The quantity of soluble organics can be measured as BOD, COD or TOC (Total Organic Carbon). However, each of these parameters will measure differing amounts of soluble organics. For example, many organic compounds which are dichromate oxidizable (COD) are not biochemically oxidizable (BOD). Also, many inorganic substances such as sulfides, nitrites, etc., are oxidized by

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dichromate (COD) which may be misleading when estimating the organic content of the waste water. The total organic carbon determination oxidizes the carbon atoms of organic molecules to carbon dioxide, and measures the amount of carbon dioxide quantitatively. It lacks the many variables present in the COD and BOD analyses, resulting in more reliable and reproducible results for organic determinations.

In general, other pollutant parameters have not been selected because they are present in relatively small quantities. There are a few notable exceptions, however. Dissolved salts, such as chlorides and sulfates, are often present in large quantities. Treatment technologies to reduce or remove these constituents may be expensive and in many cases the costs are prohibitive at this time.

Titanium dioxide manufacture generates a waste stream containing many types of metal ions. Treatment and removal of iron will coincidently remove other metals to acceptable levels. Therefore, other waste water constituents have not been the subject of effluent guidelines, even though they may be present in large quantities.

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SECTION VII

CONTROL AND TREATMENT TECHNOLOGY

Alternative control and treatment technologies for each chemical subcategory are discussed in detail on the following pages.

SPECIFIC CONTROL AND TREATMENT PRACTICES IN THE INDUSTRY

Aluminum Chloride

Direct chlorination of aluminum to produce aluminum chloride is a relatively simple process. Plants are small (9 to 18 metric tons/day). There is no process water involved, nor usually any cooling water. The only source of water wastes is from equipment used to treat air-borne wastes such as aluminum chloride dust around the packing station and aluminum chloride and chlorine from the air-cooled condensers.

In some plants, run on the aluminum-rich side (white or gray aluminum chloride), there is very little chlorine in the discharge from the air-cooled condenser. Also, the gas volume from the condenser is such that only a very small quantity of aluminum chloride is discharged. In such plants there may be no air pollution control provision. One exemplary plant operates in this fashion. In plants operating on the chlorine-rich side (yellow aluminum chloride), water scrubbing of the air condenser discharge gases is needed.

At least three practicable, economically feasible, and low energy air pollution control approaches are available:

(1) No air or gas treatment for gray or white aluminum chloride.
(2) Gas scrubbing and sale of scrubber wastes. This approach is taken by an exemplary plant of this study.
(3) Gas scrubbing followed by chemical treatment to precipitate aluminum hydroxide and convert chlorine to sodium chloride. Technology available from the chlor-alkali and titanium dioxide chloride process may be applied.

Aluminum Sulfate

Current typical treatment involves use of a settling pond to remove muds followed by neutralization of residual sulfuric acid prior to discharge.

Two exemplary plants (049 and 063) have closed loop waste-water systems. Suspended solids are removed in settling vessels and ponds and the clear overflow is returned to the manufacturing process.

TABLE 38. Summary of BPCTCA and BATEA

Chemical	BPCTCA Guideline	Best Practicable Control Technology Currently Available BPCTCA	BATEA Guideline	Best Available Technology Economically Achievable BATEA
Aluminum Chloride (Anhydrous)	No discharge of pollutants in process waste waters	(1) No water scrubbers for white or grey aluminum chloride production (2) For yellow aluminum chloride production, gas scrubbing and sale of scrubber wastes as aluminum chloride solution; or (3) Gas scrubbing followed by chemical treatment to precipitate aluminum hydroxide and and recycle	Same as BPCTCA	Same as BPCTCA
Aluminum Sulfate	No discharge of pollutants in process waste waters	(1) Settling pond and reuse	Same as BPCTCA	Same as BPCTCA
Calcium Carbide	No discharge of pollutants in process waste waters	(1) Dry dust collection system	Same as BPCTCA	Same as BPCTCA
Hydrochloric Acid Chlorine Burning	No discharge of pollutants in process waste water	(1) Acid containment and isolation with centralized collection of acid wastes; and reuse	Same as BPCTCA	Same as BPCTCA
Hydrofluoric Acid	No discharge of pollutants in process waste waters	(1) Acid containment and isolation; and reuse	Same as BPCTCA	Same as BPCTCA
Sodium Bicarbonate	No discharge of pollutants in process waste water	(1) Evaporation and product recovery; or (2) Recycle to process;	Same as BPCTCA	Same as BPCTCA
Sodium Chloride (Solar Process)	Return of unused salts to the brine source	(1) Good housekeeping to prevent contamination of waste salts	Same as BPCTCA	Same as BPCTCA
Sodium Silicate	TSS 0.005	(1) Storage of wastes in an evaporation pond; or (2) Ponding and clarification	No discharge of pollutants in process waste water	Ponding or clarification and recycle of the treated waste water
Sulfuric Acid (Sulfur Burning Contact Process)	No discharge of pollutants in process waste water	(1) Acid containment and isolation with recycle to process or sale as weak acid;	Same as BPCTCA	Same as BPCTCA

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TABLE 38. Summary of BPCTCA and BATEA (continued)

Chemical	BPCTCA Guideline	Best Practicable Control Technology Currently Available BPCTCA	BATEA Guideline	Best Available Technology Economically Achievable BATEA
Lime	No discharge of pollutants in process waste water	(1) Dry Bag Collection System; or (2) Treatment of scrubber water by ponding and clarification and recycle	Same as BPCTCA	Same as BPCTCA
Nitric Acid	No discharge of pollutants in process waste water	(1) Acid containment and isolation and reuse	Same as BPCTCA	Same as BPCTCA
Potassium (Metal)	No discharge of pollutants in process waste water	(1) No process water used in manufacture	Same as BPCTCA	Same as BPCTCA
Potassium Dichromate	No discharge of pollutants in process waste water	(1) Replacement of barometric condensers with non-contact heat exchangers; recycle of process liquor	Same as BPCTCA	Same as BPCTCA
Potassium Sulfate	No discharge of pollutants in process waste water	(1) Evaporation of brine waters with recovery of magnesium chlorine; or (2) Reuse of brine solution in process in place of process water;	Same as BPCTCA	Same as BPCTCA

Chemical	BPCTCA Flow liters/kkg	BPCTCA Limitation kg/kkg TSS	BPCTCA Limitation kg/kkg Other	BPCTCA	BATEA Flow liters/kkg	BATEA Limitation kg/kkg TSS	BATEA
Calcium Chloride (Brine Extraction)	330	0.0082	-	(1) Settling pond or clarification	No discharge of pollutants in process waste water		Same as BPCTCA plus (1) Replacement of barometric condensers with noncontact heat exchangers; and additional recycle
Hydrogen Peroxide (Organic)	16,000	0.40	0.22 TOC	(1) Isolation and containment of process wastes; oil separation and clarification	No discharge of pollutants in process waste water		(1) Chemical decomposition for peroxide removal (2) Carbon adsorption for organic removal
Sodium (Metal)	9,000	0.23	-	(1) Settling pond; and (2) Partial recycle of brine waste solution after treatment	No discharge of pollutants in process waste water		100% brine recycle and reuse or sale of spent sulfuric acid
Sodium Chloride (Solution Mining)	6,400	0.15	-	(1) Containment and isolation of spills, packaging wastes, scrubbers, etc; partial recycle to brine cavity	No discharge of pollutants in process waste water		Same as BPCTCA plus (1) Replacement of barometric condensers with noncontact heat exchangers
Sodium Sulfite	630	0.016	1.7** COD (As Cr_2O_7	(1) Air oxidation of sodium sulfite wastes to sodium sulfate — 94% effective; and final filtration to remove suspended solids	No discharge of pollutants in process waste water		Same as BPCTCA plus recovery of waste sodium sulfate
Soda Ash (Sodium Carbonate) Solvay Process	6,900	0.17	-	(1) Settling ponds	6,900	0.10	(1) Settling ponds and clarification

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TABLE 38. Summary of BPCTCA and BATEA (continued)

Chemical	BPCTCA Guideline Flow liters/kkg	Limitation kg/kkg TSS	Limitation kg/kkg Other	Best Practicable Control Technology Currently Available BPCTCA	BATEA Guideline	Best Available Technology Economically Achievable BATEA
Hydrogen Peroxide (Electrolytic)	95	0.0025	0.002 CN^-	(1) Ion exchange to convert sodium ferrocyanide to ammonium ferrocyanide which is then reacted with hypochlorite solution to oxidize it to cyanate solutions; and (2) Settling pond or filtration to remove catalyst and suspended solids	No discharge of pollutants in process waste water	(1) Same as BPCTCA plus segregation of waste water from cooling water and evaporation of the waste stream and recycle of the distillate
Sodium Dichromate and Sodium Sulfate	8,900	0.22	0.0005 Cr^{+6} 0.0044 Cr(total)	(1) Isolation and containment of spills, leaks, and runn off; and (2) Batchwise treatment to reduce hexavalent chromium to trivalent chromium with NaHS, plus precipitation with lime or caustic; and (3) Settling pond with controlled discharge	No discharge of pollutants in process waste water	Same as BPCTCA plus (1) Evaporation of the settling pond effluent with recycle of water and land disposal or recovery of solid waste
Chlor-alkali (Diaphragm Cell)	3,300	0.32	0.0025 Pb	(1) Asbestos and cell rebuild wastes are filtered or settled in ponds then land dumped; and (2) Chlorinated organic wastes are incinerated or land dumped; and (3) Purification muds from brine purification are turned to salt cavity or sent to evaporation pond/settling pond; and (4) Weak Caustic—brine solution from the caustic filters is partially recycled	No discharge of pollutants in process waste waster	Same as BPCTCA plus (1) Reuse or sell waste sulfuric acid (2) Catalytic treatment of the hypochlorite waste and reuse or recovery (3) Recycle of all weak brine solutions (4) Conversion to stable anodes
Chlor-alkali (Mercury Cell)	21,000	0.32	0.00014 Hg	(1) Cell rebuilding wastes are filtered or placed in settling pond, then used for landfill; and (2) Chlorindated organic wastes are incinerated or placed in containers and land dumped; and (3) Purification muds from brine purification are returned to brine cavity or sent to evaporation/settling ponds; and (4) Partial recycle of brine waste streams; and (5) Recovery and reuse of mercury effluent by curbing, insulation and collection of mercury containing streams, then treatment with sodium sulfide	No discharge of pollutants in process waste water	Same as BPCTCA plus (1) Reuse or recovery of waste sulfuric acid (2) Catalytic treatment of the hypochlorite waste and reuse or recovery (3) Recycle of all weak brine solutions

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(continued on next page)

TABLE 38. Summary of BPCTCA and BATEA (continued)

Chemical	BPCTCA Guideline Flow liters/kkg	Limitation kg/kkg TSS	Limitation kg/kkg Other	Best Practicable Control Technology Currently Available BPCTCA	BATEA Guideline		Best Available Technology Economically Achievable BATEA
Titanium Dioxide (Chloride Process)	90,500	2.2	Iron 0.36	(1) Neutralization with lime or caustic; and (2) Removal of suspended solids with settling ponds or clarifier-thickener; and (3) Recovery of by-products .g., V, Al, Si, Cr, Mn, Nb & Zr.	TSS 1.3	Iron 0.18	Same as BPCTCA plus additional clarification and polishing
Titanium Dioxide (Sulfate Process)	210,000	10.5	Iron 0.84	(1) Neutralization with lime or caustic; and (2) Removal of suspended solids with settling ponds or clarifier-thickener; and (3) Recovery of by-products	TSS 5.3	Iron 0.42	Same as BPCTCA plus addition clarification and polishing

*Monthly average values. To convert from metric units to English units (lbs/ton), multiply the above values by 2.

**COD of 2720 mg of dichromate ion per lite-

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Calcium Carbide

There is no process water involved in the production of calcium carbide. Ancillary water wastes such as cooling tower blowdowns and ion exchange regenerants are often present. There may also be water-borne wastes from air pollution control equipment.

Water-borne wastes from air-borne waste control equipment may be avoided by use of dry bag collector systems. Unlike aluminum chloride, the air-borne wastes from the calcium carbide process are all dusts -- coke and coal fines, limestone powder and calcium carbide from the packing station. Coke, coal and limestone fines, which constitute a significant fraction of the feed materials, may be profitably returned to the system. One plant uses only dry bag collectors and recycles the collected fines to the furnace.

Dry bag collection of air-borne fines eliminates waterborne wastes and makes it possible to reuse these fines. It also significantly reduces energy requirements by avoiding high energy drying costs needed for recovery of water wastes.

Calcium Chloride

This chemical is obtained both from soda ash wastes and from natural salt deposits. The soda ash produces large amounts of calcium chloride as a by-product. Unreacted sodium chloride and other dissolved solids are present in this waste stream. After calcium chloride is extracted from this waste stream, the remaining calcium chloride, sodium chloride and other dissolved solids may be returned to the waste stream of soda ash manufacture. Extraction of calcium chloride from natural salt deposits is carried out in a major chemical complex and is scheduled within the next six months to be brought to virtually a zero process waste water pollutant discharge. Since both processes are dissimilar, there are no typical practices. The two major producers differ widely in their treatment approach.

From the soda ash process, recovery of calcium chloride is considered as a zero discharge process similar to sodium sulfate from the sodium dichromate process. There are no additional wastes generated as a result of this recovery.

The natural salt process, on the other hand, utilizes the integrated nature of the complex where it is produced to take advantage of every normal waste. Sodium chloride goes to chlor-alkali facilities. Magnesium chloride, which is often difficult to dispose, is isolated and used for other processes. Consequently this process for making calcium chloride also has no effluent in the particular complex where it is made. This is a good example of the previously discussed principle that wastes

from a complex should never be greater than the sum of the individual plants and usually will be significantly less.

Calcium Oxide and Calcium Hydroxide

The process for producing calcium oxide involves no water-borne wastes. Waste water treatment is required only when wet scrubbers are used to remove entrained dust from the gaseous effluent.

Practices evidently vary from one plant to another as far as air pollution control practices are concerned. Some plants have no facilities for air-borne wastes, others use water scrubbers or dry bag collectors.

Water-borne wastes from air-borne waste control equipment may be avoided by use of dry bag collector systems. Unlike aluminum chloride, the air-borne wastes from the calcium oxide process are all dusts. This dust may be profitably returned to the system. The exemplary plant of this study uses only dry bag collectors and recycles collected fines.

Dry bag collection of air-borne fines not only eliminates water-borne wastes and makes it possible to reuse these fines, but it also significantly reduces energy requirements by avoiding high energy drying costs needed for recovery of water wastes.

If wet scrubbers are used, the scrubber solution may be discharged to a settling pond or vessel and recycled to the scrubbing system after sedimentation of suspended solids.

Chlorine and Sodium or Potassium Hydroxide

Chlorine is produced by three major processes: mercury cells, diaphragm cells and Downs Cells. The other chemicals produced are sodium (Downs Cell only), sodium hydroxide and potassium hydroxide, variously. There is also quite often a direct burning hydrochloric acid plant in the complex.

The following chlorine discussion includes mercury and diaphragm cell productions. Downs Cell operation will be discussed under sodium, but the chlorine-based wastes are the same as for the mercury and diaphragm cells.

The chlor-alkali industry uses salt (sodium chloride or potassium chloride) as its raw material. Transformations of all sodium and chlorine chemicals can and have been made in chlor-alkali plants. There is a fortunate situation from the standpoint of waste reduction and zero discharge. In contrast, for example, are the soda ash process which produces large quantities of calcium chloride and the potassium dichromate process which produces large quantities of sodium chloride. Currently, there is only a

limited use for these waste products. Examples of how waste conversions can be made in the chlor-alkali process are given in the following equations:

(1) $2NaCl \longrightarrow 2Na + Cl_2$
(2) $2Na + 2H_2O \longrightarrow 2NaOH + H_2$
(3) $2NaOH + Cl_2 \longrightarrow NaOCl + NaCl + H_2O$
(4) $2NaOCl + Cat. \longrightarrow 2NaCl + O_2$
(5) $Cl_2 + H_2 \longrightarrow 2HCl$
(6) $HCl + NaOH \longrightarrow NaCl + H_2O$

Equations (1) and (2) show the product formations. Equation (3) represents tail gas scrubbing operations to remove chlorine gas from air effluents from the plants. Equation (4) shows conversion of sodium hypochlorite back to salt raw reactant materials. Equation (5) eliminates waste chlorine gas by direct burning of chlorine to produce hydrochloric acid. Equation (6) uses hydrochloric acid to neutralize waste sodium hydroxide, thereby producing salt for return to the system. Provided the water-borne waste streams are kept isolated from much larger cooling water streams, control and treatment techniques are entirely feasible.

Salt impurities have to be removed by precipitations before the brine solutions can be used in the cells. Treatment with soda ash, sodium hydroxide, and sometimes barium chloride, removes calcium, magnesium and sulfate ions as calcium carbonate, magnesium hydroxides and barium sulfates, respectively. The precipitated muds may be removed in ponds or clarification tanks. The muds may be disposed of by land dumping or fill.

Brine and sulfuric acid wastes may be neutralized with lime or sodium hydroxide, and ponded for reduction of suspended solids.

Water-borne mercury in the mercury cell process may be treated and removed by a variety of processes, usually employing precipitation of mercury sulfides, followed by mercury recovery by roasting or chemical treatment processes. Plants with typical recovery systems reduce mercury in the plant effluent to 0.11 to 0.22 kg/day (0.25-0.50 lb/day).

Total waste reduction depends on in-process control, isolation, treatment and reuse. There is no known problem which has not been solved by at least one plant of this survey.

Mercury cells are inherently "cleaner" processes than the diaphragm cells. Diaphragm cells have asbestos diaphragm deteriorations with suspended asbestos wastes. These have to be filtered out or allowed to settle in ponds. Sodium hydroxide produced in diaphragm cells has sodium chloride and other wastes and has to be purified for many uses.

A sodium sulfate purge, made by back-washing the precipitated salt slurry on the filter during the evaporation concentration of sodium hydroxide, is also needed to ensure satisfactory diaphragm cell operation. This sulfate purge can be handled by removing it from the system and using it elsewhere (as is done by exemplary diaphragm cell plant 057), by returning it for sulfate removal in the brine purification, or by recovery of sodium sulfate for sale.

Another waste from the diaphragm process, but not the mercury cell, is organic waste from the graphite anode. These are currently land disposed by the exemplary diaphragm cell plant, but are allowed to go out in waste streams at others.

Waste sulfuric acid from the chlorine-drying step may be used for neutralizations in other processes, sale, shipment to a regen sulfuric acid plant or concentration.

Collected chlorine gas for abatement of air-borne wastes can be burned to produce hydrochloric acid or converted to sodium chloride as discussed earlier.

Diaphragm cells are prone to develop cracks around their anode protective resin seals and lead salts from the underlying lead mountings can get into the effluents. Metal anodes can eliminate this problem and at a reported significant reduction in required cell electrical energy load.

The mercury cell, although "cleaner" than the diaphragm process, has a major waste problem in the form of mercury in the water-borne wastes. Major expenditures (discussed quantitatively in Section VIII) and in-process modifications have been made to alleviate this problem. Three plants discussed in section V reduce their mercury discharge to 0.00057, 0.000069 and 0.00007 kg/kkg (0.0011, 0.000137, 0.00014 lb/ton). A small, 140 ton/day plant has reportedly reduced its mercury discharge to an average of 0.000143 kg/kkg (0.000286 lb/ton). These low levels are accomplished by isolation of mercury-containing waste streams and chemical treatment of these streams.

Although no specific mention has been made of potassium hydroxide production, the same principles hold except that potassium is substituted for sodium.

By employing extensive treatment, control, recycle, and recovery, the chlor-alkali process may be operated with no discharge of process waste water pollutants to navigable waters.

Hydrochloric Acid

The only process considered in this study is chlorine burning. Only about ten percent of the U.S. production comes from this

process. Most hydrochloric acid is produced as a by-product of other processes. The chlorine-burning process is a simple one and capital equipment is relatively inexpensive. The process fits well with chlor-alkali complexes where low-cost or waste chlorine (and possibly hydrogen from mercury cells) is readily available.

There is no water-borne process waste during normal operation. A small amount of chlorine and hydrochloric acid wastes is developed during startup. Neutralization with sodium hydroxide can be followed by forwarding the neutralized stream to other chlor-alkali complex uses such as make-up water for brine solutions used in mercury or diaphragm cells. The size of the waste load, excluding that from the air-borne hydrogen chloride treatment, is small - 0.5 to 1.0 kg/kkg.

Since there are no process wastes, spills, leaks, contributions from air-borne hydrogen chloride waste treatment equipment, and startup and upset wastes are the only concerns. Base treatment and control of these small miscellaneous wastes consists of neutralization with available sodium hydroxide followed by discharge to surface water.

Leaks, spills and startup wastes may be minimized by good housekeeping, operation, equipment maintenance and production planning. These wastes are not at this time directly related to a unit of production and may need to be limited on a case by case basis. To reduce water-borne wastes, containment and isolation techniques are required. Dikes, dip pans and other devices are used to control leaks and spills. Centralized collection and neutralization with sodium hydroxide can be followed by forwarding the neutralized stream to other chlor-alkali complex uses such as make-up water for brine solutions used in mercury or diaphragm cells. The size of the waste load, excluding that from the air-borne hydrogen chloride treatment, is small - 0.5 to one kg/kkg.

Hydrofluoric Acid

Hydrofluoric acid sells for approximately $550/kkg. Therefore, the incentive for containment and recovery of leaks, spills and other product losses is understandably greater than for the other mineral acids. By the nature of the process, large quantities of cooling water are required. This is in the non-contact category, however, such that water-borne process waste loads are small.

Neutralization of sulfuric and hydrofluoric acid wastes with lime, followed by removal of precipitated calcium sulfate and calcium fluoride in settling ponds, reduces fluorides to 18 mg/l and calcium sulfate to approximately 2000 mg/l in treated water streams.

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Segregation of the leaks, spills and sulfuric acid-containing wastes from the cooling water reduces the quantity of water which has to be treated. Also by in-process changes, such as using stoichiometric quantities of sulfuric acid in the process reactor, the sulfuric acid may be eliminated from the process waste water stream.

Lime treatment of the isolated wastes and settling pond removal of the precipitate reduces the fluoride content of this small stream to approximately 10 mg/l. This procedure gives waste with less than 0.5 kg total dissolved solids kkg (1 lb/ton) of hydrofluoric acid. This treatment makes closed cycle operation possible.

There are no air pollution problems for this process, but massive calcium sulfate solid wastes (3400-4250 kg/kkg (6800-8500 lb/ton) of hydrofluoric acid) from the process reactor give both land disposal and rainwater runoff problems. Storage piles of this calcium sulfate should be located and contained so that materials such as calcium sulfate and residual lime or sulfuric acid are not conveyed by rainwater runoff to surface or underground fresh water streams.

Hydrogen Peroxide

a) Organic process

The organic process effluent generally contains waste hydrogen peroxide plus organic solvent used in the process. The nature of this solvent is considered a trade secret.

The hydrogen peroxide waste may be decomposed with scrap iron. The organic solvent may be removed by skimming the insoluble layer off the top of the water stream. The effluent may then be passed into a settling pond for removal of suspended solids or organic solvent interaction with suspended solids from other processes. Additional isolation, containment and treatment of wastes with scrap iron for peroxides and skimming separation for organics further reduces the waste loads.

Organics may be removed from this waste water stream by biological digestion or carbon adsorption treatment.

b) Electrolytic process

The electrolytic process for making hydrogen peroxide is represented by a single U.S. plant (100). Its effluent has practically the same composition as the incoming water, because the relatively very small amount of process water discharged is combined with the very large cooling water stream. Present levels were accomplished by in-process controls. The total water flow into the plant is about 41,600 cu m/day or 3,470,00 l/kkg

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(11,000,000 gal/day or 11,000,000 gal/ton). 75.7 cu m/day or 6300 l/kkg (20,000 gal/day or 1830 gal/ton) is treated by ion exchange and used for boiler feed and process water. Discharges of this waste include 3.8 cu m/day or 316 l/kkg (1000 gal/day or 92 gal/ton) of ion exchange blowdown, 26.5 cu m/day or 2200 l/kkg (7000 gal/day or 640 gal/ton) of boiler blowdown and 1.1 cu m/day or 95 l/kkg (290 gal/day or 27.6 gal/ton) of process water effluent. This latter stream may be eliminated by simple procedures such as total evaporation which is economically feasible because of the small quantity.

Nitric Acid

There are generally no water-borne process wastes. There are usually no water-borne wastes from air pollution abatement practices. Cooling water requirements are high. Minor water-borne wastes are due to leaks, spills and washdowns and ancillary systems such as cooling towers.

Provisions may be made for handling and neutralizing spills and leaks. Neutralization can be done with limestone, oyster or clam shells, lime or sodium hydroxide. Collected leaks, spills and washdowns may be returned to the process.

Diking of tanks, pump areas, loading and washing areas may be combined with isolation and reuse of leaks, spills and washdowns. Diking of large tanks should be sufficient for complete containment. Emergency ponds should be provided for major upsets. Limestone or seashell pond linings and ground coverings may be used for neutralizations.

Potassium Metal

There are no water-borne wastes from this process.

Potassium Chromates

Potassium dichromate is made from the reaction of sodium dichromate with potassium chloride. There is none of the massive ore waste present as in the sodium dichromate process. The only water-borne wastes from the major U.S. production facility emanate from contamination of once-through cooling water used in the barometric condensers. These are scheduled for replacement in 1974 by heat exchangers using non-contact cooling water. This will result in no discharge of waterborne wastes.

Potassium Sulfate

The exemplary plant for production of potassium sulfate is plant 118. It is a closed cycle plant where water recovery is accomplished by distillation of 1,500 cu m/day (400 gpd).

Sodium Bicarbonate

Typical treatment practices involve the settling of suspended solids in ponds before discharging the effluent to surface waters.

The untreated effluent from this process is essentially sodium carbonate in solution. In a complex, use for this solution may be made, probably at lower cost than for recovery. Present waterborne wastes are a relatively low 6.5 kg/kkg (13 lb/ton) of product.

By keeping the waste stream small and the solids level high, evaporative techniques are feasible without undue expense. The evaporation process yields demineralized water for boilers, plus recovered product worth $36/kkg ($32/ton). An alternative approach would involve total recycle.

Sodium Carbonate

The Solvay Process for making sodium carbonate (soda ash) is an old one dating back to the late 1800's. The Solvay plants are also old, the last U.S. plant being built in the 1930's.

The Solvay Process discharges more poundage of waste into surface water (solid basis) than any other chemical of this study (sodium chloride producers deep-well or store most of their effluent). The only redeemi- feature is the relatively low toxicity of the waste.

Present treatment of water-borne wastes consists of removing most of the suspended calcium carbonate and other solids in unlined settling ponds followed by discharge to surface water. Adjustment for pH may or may not be done prior to this discharge.

The water-borne wastes from the Solvay Process are suspended and dissolved solids. The suspended solids are removed effectively by settling ponds and polish filtering can be done, if necessary, to reduce total suspended solids levels to 25 mg/l.

Dissolved solids are generally present in high concentrations. There are many treatment technologies available which can be used to eliminate the dissolved solids from the water effluent. However, most of them are not economically practical for the Solvay Process. Also, the geographical location of the plant has a major bearing on the treatment and disposal feasibility and costs.

A new plant of the Solvay Process is very unlikely to be considered. If a new Solvay Process plant were to be built, the process itself would likely be revised. Process modifications now in the laboratory or pilot plant stages would have to be

investigated and developed for commercial feasibility. The major area of revision would be in the recovery of ammonia from ammonium chloride. Use and recovery of magnesium hydroxide or decomposition of ammonium chloride to ammonia and chlorine are two such modifications that have been proposed. Recovery and reuse of the excess sodium chloride in the waste effluent could be accomplished by evaporation and crystallization techniques similar to those for the salt industry.

Sodium Chloride

Waste disposal is usually accomplished by pumping the brine wastes back into the well or mine when sodium chloride is made by the brine extraction process. In the solar evaporation process, brine wastes are normally returned to the source of the salt solution. Storage and recovery of magnesium and potassium salts is technically feasible, but appears uneconomical in most instances.

Sodium Dichromate and Sodium Sulfate

Typical treatment is to reduce the hexavalent chromium ion in the waste to trivalent chromium, remove the suspended solids in a settling pond, and discharge the clear solution to surface water. Ferrous chloride is often used as a reducing agent.

An exemplary chromium treatment and control plant (184) includes isolation of all chromium-containing, water-borne wastes from cooling water, collection of these wastes in tanks, batchwise treatment for hexavalent chromium reduction, and pond settling of suspended solids. The hexavalent chromium content remaining after treatment is very low. Provisions are made in this plant for collection and treatment of rainwater.

Although the treatment and control technologies described above are excellent for chromium treatment and control, two environmental problems remain -- disposal of large quantities of solids which gradually fill the settling ponds and discharge of large quantities of dissolved sodium chloride into surface water. The settled solids can be landfilled and the sodium chloride can be recovered by evaporation techniques and sold.

Sodium Metal

Sodium metal is produced in a Downs Cell Process. Chlorine, produced simultaneously with the sodium, is covered under chlorine. The treatment and control problems for chlorine, once it leaves the cell, are the same for the Downs Cell product as for the mercury and diaphragm cells.

The non-chlorine based wastes consist of brine purification muds, cell wastes such as bricks, graphite, sodium chloride and calcium

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chloride, and sodium-calcium sludge from the sodium cooling and purification step. Settling ponds may be used for mud removal. Bricks, graphite and other solids may be landfilled. Sodium chloride and calcium chloride may be washed down and allowed to flow to surface water.

In the exemplary plant of this study, the only cell-based wastes not land dumped are the sodium and calcium chlorides. These salts, lost to the extent of an estimated 88 kilograms/kkg of sodium produced, result from cell dumpings, wash tanks, and run offs. These wastes are not currently controlled, and are allowed to run off over the land into surface water. Isolation and collection would make it possible to recover and reuse the sodium and calcium chlorides in the incoming brine system. One possible procedure would be to recycle this weak brine into the brine purification system. This stream can also be concentrated to recover, first any calcium sulfate or sodium sulfate, secondly sodium chloride, and finally, calcium chloride. Sodium chloride and calcium chloride can be dumped. Sodium sulfate can be sold or it may be containerized and disposed of.

Treatment methods for chlor-alkali facilities to eliminate the discharge of process waste water pollutants are applicable to chlorine production using the Downs Cell Process.

Sodium Silicate

Contaminated waste streams containing sodium hydroxide, sodium silicate and filter aids may be sent to settling ponds to remove suspended solids. Waste water may then neutralized and discharged to surface water.

The wastes from sodium silicate plants are minor such that closed loop zero discharge operation is feasible.

Sodium Sulfite

The wastes from this process are primarily sodium sulfite and sodium sulfate. The sulfites constitute a heavy chemical oxygen demand (COD). Typical treatment, at least until recently, has consisted of using large quantities of cooling water to dilute the waste load.

Technology is now being applied to effect a ninety-five percent conversion of sulfite to sulfate by air oxidation.

Recovery of the sodium sulfate from the effluent eliminates process waste is technologically and economically feasible. Recovery eliminates the sulfite process waste and provides both a saleable product and a supply of high quality demineralized water for boiler, cooling tower, or process use.

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Sulfuric Acid

There are generally no process wastes from the sulfur-burning sulfuric acid plants. The only water-borne wastes result from spills, leaks, washdowns, and air-borne sulfur dioxide scrubbers.

Leaks, spills and washdowns may be detected by monitoring pH instrumentation. In-process leaks give serious corrosion problems so that shutdown and repair is in order as soon as these leaks are detected. Neutralization with lime or sodium hydroxide is used to control the pH level of the effluent.

Containment, isolation, and reuse or neutralization of minor leaks, spills and washdowns may be obtained with dikes, catch pans, sumps and drain systems. Major storage tanks should be sufficiently diked for complete storage tank capacity containment. Pond linings and pertinent plant grounds coverings of limestone or seashells can provide automatic neutralization. pollution devices to remove sulfur dioxide sometimes contribute to the water-borne waste load. This may be avoided by utilizing sulfur dioxide removal processes which do not generate waste water streams. They should be used for all future installations. These non-water waste processes include double-absorption add-ons (for existing plants), and molecular sieve processes. Several other processes are either in commercial or developmental status.

Existing sulfur dioxide control equipment which invoves water-borne waste can be converted to a waste-free basis by concerntration and recovery of dissolved solids. A sulfuric acid plant in Finland neutralizes its scrubber effluent and concentrates the salt solution for use as fertilizer feed.

Titanium Dioxide

The titanium dioxide industry is in a state of flux. Rutile is in a very short supply and most chloride process producers need this ore or a synthetic version of it. "Synthetic rutiles", or beneficiated low grade ores, are being offered by various foreign and a few domestic suppliers. A company in Japan has operated a 27,000 kkg (24.6 ton) plant since 1971 and is expanding to 40,000 kkg (36.4 tons). One U.S. company has announced a proposed 45,000 kkg/yr (41,000 ton/yr) plant using Australian technology. A comprehensive discussion of ore deposits, their composition, and beneficiation techniques may be found in Dr. Thomas S. Mackey's article "Alteration and Recovery of Ilmenite and Rutile", Australian Mining, November 1972, pp. 18-94.

a) Chloride process

Waste streams for the chloride process fall into two categories:

1. Chlorination wastes composed of sludge from titanium tetrachloride losses and
2. Wastes incurred during the oxidation process and treatment of titanium dioxide product.

Base level treatment usually includes ponding to remove titanium dioxide, ore, coke and other settleable solids.

Three techniques for more effective treatment or disposal of chloride process wastes are available; neutralization of acids and conversion of metallic chlorides to insoluble oxides, ocean barging and deep welling.

A full chemical treatment system is used in plant 009. Chemical neutralization tanks, a clarifier, a thickener, and filters followed by a pond system are used for full acid neutralization, conversion and precipitation of metallic oxides, and concentration of suspended solids into a sludge. The sludge is disposed of as land fill. Both of the main chloride process waste streams, chlorination solids and oxidation process and titanium dioxide product-treatment wastes, are put through the chemical treatment system. The water-borne wastes from the system consist primarily of dissolved calcium chloride.

Deep-welling of the chlorinated wastes is practiced by plant 160. The oxidation and titanium dioxide product treatment wastes are sent through a settling pond system and discharged to surface water. Such deep well disposal is not a general solution to waste abatement practices, since it is not geologically feasible in many sections of the country. Ocean barging is also used to dispose of chloride process wastes, but this method of disposal is not universally applicable either. Both of these disposal techniques are subject to stringent permit requirements and must be consistent with local, State and Federal regulations.

The major chloride process wastes, particularly when low grade ore is used, are ferrous and ferric chlorides. Various proposals have been made for disposing of these chlorides. Included in these proposals are processes for decomposing the iron chlorides to iron oxide and hydrochloric acid (favored for pickle liquor recovery), a process for oxidation of iron chlorides to iron oxides and chlorine, and sale of the iron chlorides as such. Beneficiation of ore by chlorination, separation of iron chlorides, and dechlorination of the iron chlorides is another procedure. All of the above are still in the exploratory, laboratory, pilot plant or other preliminary stage at this time. Bureau of Mines research is already being carried out.

b) Sulfate process

Approximately 2,000 kg of sulfuric acid and 1,000 kg of metallic sulfates/kkg of product are discharged from the sulfate process.

Low grade ores used in the process contribute major quantities of metals which may someday be profitably extracted.

Waste streams generated by the sulfate process include:

(1) sludge from the dissolving step and filtration,
(2) copperas,
(3) strong acid cuts,
(4) weak acid cuts, and
(5) titanium dioxide losses.

Wastes may be collected and sent to a settling pond for suspended solids removal.

Possible treatment and control technologies include filtration and disposal of the sludge from the dissolving step by land dumping, neutralization of both strong and weak acid cuts with limestone, followed by lime treatment to raise the pH to approximately 8 and precipitate iron and other metallic oxides and hydroxides. The conventional chemical treatment system of neutralization tanks, clarifiers, thickeners, filters or centrifuges and ponds may be employed for this purpose.

Ocean barging of the strong acid wastes, sludges and metallic sulfates is now used for disposal by some plants. Uncertainty about the future of this disposal method currently clouds its general application. Also, the weak acid and other wastes are still in many cases being discharged to surface water without significant treatment.

A pilot New Jersey Zinc Company with contract assistance from EPA is investigating the feasibility of acid recovery. Acid recovery is accompanied by treatment of the weak acid, metallic sulfates and titanium dioxide losses in the same type of chemical treatment system as discussed for complete neutralization. Acid recovery reduces the solid waste load inherent with complete neutralization and also decreases the amount of water-borne wastes. Costs are lower for this approach than for complete neutralization.

GENERAL METHODS FOR CONTROL AND TREATMENT PRACTICES IN THE INDUSTRY

Organic content and biological oxygen demands of the effluents for inorganic chemical plants are usually very low. Most alternative control and treatment technologies are well known, established and extensively practiced in the process of producing the inorganic chemicals of this study. Practices such as chemical treatment (neutralization, pH control, precipitation, and chemical reactions), filtration, centrifuging, ion exchange, demineralization, evaporation and drying are all standard unit operations for the industry. Process instrumentation, monitoring

and control for the chemical industry is outstanding. Another characteristic of the waste effluents from the inorganic chemical plants of this study is that they differ widely in both chemical nature and amount. Table 39 shows typical water-borne waste loads for the inorganic chemicals included in this study. Soda Ash (Solvay) and titanium dioxide (sulfate process) have raw waste loads in excess of the amounts of chemicals produced. On the other hand, chemicals, such as the mineral acids, calcium carbide and aluminum chloride, generate almost no water-borne wastes. Soda ash (Solvay) wastes are neutral salts while titanium dioxide (sulfate process) wastes are strongly acidic. Therefore, control and treatment technology has to be applied differently for each chemical.

Typical control and treatment technology in use on inorganic waterborne wastes today includes neutralization and pH control on effluent streams, ponds for settling of suspended solids, emergency holding, and storage, and discharge of the neutralized and clarified effluent to surface water.

Discharge of acidic or alkaline wastes to surface water is uncommon. Harmful wastes such as mercury, arsenic, cyanides, chromium and other metals are being removed with increasing efficiency. Technology has been developed for reduction of these harmful materials to very low levels.

Profitable waste segregations and recoveries, closed cycles, leak and spill containments, and in-process waste reductions are demonstrated in the industry. Some of these waste abatement programs have not involved much money, but most have been expensive. Numerous plants have reported program costs ranging from several thousand to several million dollars.

Waste abatement for the inorganic chemicals industry may be accomplished by a variety of methods. These methods may be divided into control and containment practices and treatment techniques. In many cases the control and containment practices are more important than subsequent treatments as far as feasibility and costs of waste treatment are concerned. The reasons for this are discussed in the following sections.

In-process controls

Control of the wastes includes in-process abatement measures, monitoring techniques, safety practices, housekeeping, containment provisions and segregation practices. Each of these categories is discussed including the interactions with treatment techniques.

TABLE 39. Typical Water-Borne Loads for Inorganic Chemicals of this Study

Chemical	Annual Production kkg	Waste Load* kg/kkg Product	Total Waste* kkg/yr
Sodium Chloride	39,000,000	150	5,850,000
Soda Ash (Solvay)	3,630,000	1,500	5,440,000
Titanium Dioxide (Sulfate)	374,000	5,000	1,870,000
Chloride (Non-Rutile)	186,000	400	744,000
Chloride (Rutile)	64,000	75	4,800
Chlorine-Sodium Hydroxide	8,600,000	150	1,300,000
Sodium	150,000	150	22,500
Sulfuric Acid (Sulfur Burning)	27,200,000	0.5	13,600
Sodium Dichromate	136,000	58	13,600
Sodium Silicate	601,000	7.5	4,500
AluminumSulfate	1,020,000	3.5	3,570
Nitric Acid	6,300,000	0.25	1,590
Hydrogen Peroxide	64,000	20	1,270
Hydrofluoric Acid	281,000	4	1,120
Sodium Bicarbonate	186,000	4.5	840
Aluminum Chloride	31,000	24	725
Sodium Sulfite	209,000	3	625
Calcium Carbide	834,000	0.5	415
Hydrochloric Acid (Direct Burning)	200,000	0.5	100

NOTES:

1) Production figures were taken from Chem. & Eng. News, May 7, 1973, pp. 8-9 and "The Economics of Clean Water", Vol. III, Inorganic Chemicals Industry Profile, U.S. Dept. of the Interior, Federal Water Pollution Control Admin., March, 1970.
2) Typical waste loads were estimated from Final Technical Report, Contract No. 68-01-0020, Industrial Waste Study of Inorganic Chemicals, Alkalies and Chlorine, General Technologies Corp., July 23, 1971 (for EPA).
3) Titanium dioxide industry production figures were estimated from Chem. & Eng. News, February 19, 1973, pp. 8-9.

*Solids basis.

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Raw Materials

Purity of the raw materials used in the manufacturing process influences the waste load. Inert or unusable components coming into the process are generally discharged as waste.

Control of these impurities can be exercised in many instances. Ores can be washed, purified, separated, beneficiated or otherwise treated to reduce the waste coming into the process. An important facet of this approach is that this treatment can often be done at the mining site where such operations can be contained or handled on the premises. Reduction of shipping charges also favors beneficiation at the mine. Sometimes, as for "synthetic rutile" used in the titanium dioxide chloride process, beneficiated or high quality ore is necessary for developed process technology. Economics of raw material purity need to be balanced against the attendant waste treatment and disposal costs. As waste costs change, it may become more economical to use high quality materials.

Although pure raw materials reduce the inherent waste load, there are instances where, aside from economic factors, it may be desirable to use an impure material. In large manufacturing complexes, wastes from one process may be used for useful purpose in another. This procedure not only eliminates a bothersome waste from one process, it also gives economic value in the other. An example is the use of spent sulfuric acid in decomp plants. Recycled raw materials serve the same desirable function.

Reactions

Except in rare cases such as the mining of salt or soda ash (trona), chemical reaction is involved in the manufacture of inorganic chemicals. Sometimes the reactants are stoichiometrically involved, but more often than not an excess of one or more of the reactants is used. The purposes of the excess vary but include:

1. certainty that the more expensive reactants are completely utilized;
2. yield improvement by driving the reaction in the desired direction;
3. safety concerns where it is imperative that a given reactant be eliminated;
4. shortening reaction time.

Excess reactants must be recovered for recycle or else they become part of the waste load. Often when the cost of the excess reactants was small, it had been more economical to let them go into the waste load rather than recover them. Sodium and calcium chlorides and sulfates are among the most common materials so handled.

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Reactions may often be made to operate at more nearly stoichiometric conditions and thereby reduce waste loads. Also, the waste load may be deliberately changed in many cases by changing the reactant ratio. In the burning of hydrogen and chlorine to form hydrogen chloride, operating on the chlorine-rich side provides more troublesome waste than operating on the hydrogen-rich side. Similarly, aluminum chloride made on the chlorine-rich side requires air scrubbing to remove excess chlorine, while the aluminum-rich side does not.

Many chemical reactions are either faster and more complete at high temperatures or are exothermic and generate high temperatures. To produce, control and/or reduce these temperatures, cooling water and steam are often used. If the water or steam is used without contact (such as in a shell and tube heat exchanger), it is not contaminated. If, however, the water or steam contacts the reactants, then contamination of the water results and the waste load increases. Therefore, reaction heating and cooling should be non-contact whenever feasible.

Separations, purifications and recoveries

After reaction, the products, by-products, impurities, inerts and other materials present need to be separated, purified and recovered. Separations are carried out exploiting differences in boiling points, freezing points, solubility and reactivity to separate products from impurities, by-products and wastes. The efficiency of these determines:

1. the fraction of product that is lost as waste or has to be recycled;
2. the purity of the product;
3. control of air pollutants;
4. the recovery and/or disposition of by-products and wastes.

The more complete the separations into recovered product, raw materials that can be recycled, and wastes, the smaller the waste load from the process. The degree of separation actually achieved in the process depends on physical, chemical and economic considerations. These effects will be discussed for the individual chemicals of this study as they apply.

Cooling water and steam are also used in large quantities in the separation and purification steps. The same concepts apply as discussed in the reaction section. Indirect heating and cooling may, in many instances, virtually eliminate waterborne wastes.

Segregation

Probably the most important waste control technique, particularly for subsequent treatment feasibility and economics, is segregation.

Incoming pure water picks up contaminants from various uses and sources including:

1. non-contact cooling water
2. contact cooling water
3. process water
4. washings, leaks and spills
5. incoming water treatments
6. cooling tower blowdowns
7. boiler blowdowns

If wastes from these sources are segregated logically, their treatment and disposal may sometimes be eliminated entirely through use in other processes or recycle. In many instances, the treatment costs, complexity and energy requirements may be significantly reduced. Unfortunately, it is a common practice today to blend small, heavily contaminated streams into large non-contaminated streams such as cooling water effluents. Once this has been allowed to happen, treatment costs, energy requirements for these treatments, and the efficient use of water resources have all been comprised. In general, plant effluents can be segregated into:

1. Non-contaminated cooling water. Except for leaks, noncontact water has no waste pickup. It is usually high volume.
2. Process Water. Usually contaminated but often small volume.
3. Auxiliary Streams. Ion exchange regenerants, cooling tower blowdowns, boiler blowdowns, leaks, washings - low volume but often highly contaminated.

Although situations vary, the basic segregation principle is don't mix large uncontaminated cooling water streams with smaller contaiminated process and auxiliary streams prior to full treatment and/or disposal. It is almost always easier and more economical to treat and dispose of the small volumes of waste effluents - capital costs, energy requirements, and operating costs are all lower. The use of segregation will be discussed for individual chemical processes.

Monitoring techniques

Since the chemical process industry is among the leaders in instrumentation practices and application of analytical techniques to process monitoring and control, there is rarely any problem in finding technology applicable to waste water analysis.

Acidity and alkalinity are detected by pH meters, often installed for continuous monitoring and control.

Dissolved solids concentrations may be estimated by conductivity measurements, suspended solids by turbidity, and specific ions by

wet chemistry and calorimetric measurements. Flow meters of numerous varieties are available for measuring flow rates.

The pH meter is the most universal of the in-line monitoring instruments. In acid plants, hydrochloric, sulfuric, phosphoric, nitric, hydrofluoric, and chromic acid leaks in coolers, distillation columns, pumps and other equipment can be picked up almost at once. Spills, washdowns and other contributions also become quickly evident. Alarms set off by sudden pH changes alert the operators and often lead to immediate plant shutdowns or switching effluent to emergency ponds for neutralization and disposal. Use of in-line pH meters will be given additional coverage in the control and treatment sections for specific chemicals.

For monitoring and control of harmful materials such as chromates, batch techniques may be used. Each batch is analyzed before dumping. This approach provides absolute control of all wastes passing through the system. Unless the process is unusually critical, dissolved solids are not monitored continuously. Chemical analyses on grab or composite effluent samples are commonly used to establish total dissolved solids, chlorides, sulfates and other low ion concentrations.

Safety, housekeeping containment

Many of the chemicals of this study or their wastes are either harmful and/or corrosive. Examples are the acids, chromates, chlorine, sodium hydroxide, sodium, and potassium. Mercury from chlor-alkali plants is an example of a harmful waste. Containment and disposal requirements may be divided into several categories:

1. minor product spills and leaks
2. major product spills and leaks
3. upsets and disposal failures
4. rain water runoff
5. pond failures

Minor spills and leaks

There are minor spills and leaks in all industrial inorganic chemical manufacturing operations. Pump seals leak, hoses drip, washdowns of equipment are necessary, pipes and equipment leak, valves drip, tank leaks occur, solids spill and so on. The quantity of waste water as a result of leaks and spills is usually reflected by the company or plant's managerial philosophy relative to housekeeping, washdown and production planning. Leaks and spills represent a potential hazard to workmen in the area of the spill or leak. In some cases the products are valuable (such as hydrofluoric acid and titanium dioxide where every pound lost is like throwing a quarter down the drain). In

other cases, where the financial loss may not be as great, personnel safety and equipment corrosion may become paramount. When a leak develops in the heat exchanger of a sulfuric acid plant, the plant shuts down before corrosion gets out of hand. Also, phosphorus is not handled carelessly.

Reduction techniques are mainly good housekeeping and attention to sound engineering and maintenance practices. Pump seals or type of pumps are changed. Valves are selected for minimizing drips. Pipe and equipment leaks are minimized by selection of corrosion-resistant materials.

Containment techniques include drip pans under pumps, valves, critical small tanks or equipment, and known leak and drip areas such as loading or unloading stations. Solids can be cleaned up or washed down. All of these minor leaks and spills should then go to a containment system, catch basin, sump pump or other area that collects and <u>isolates</u> all of them from other water systems. They should go from this system to suitable treatment facilities.

The above mentioned techniques are being used effectively in a number of plants today, and in many cases with enhanced profitability.

Upsets and disposal failures

In many processes there are short term upsets. These may occur during startup, shutdown or during normal operation. Although these upsets represent a very small portion of overall production, they nevertheless contribute to waste loads and must be treated. The upset products may be segregated and possibly reused. In the event that this can not be done, they must be disposed of. Disposal failures require emergency tanks and/or ponds or some other expediency for temporary holding or disposition.

Pond failures

Unlined ponds are the most common treatment facility used by the inorganic chemical industry. Failures of such ponds occur because they are unlined and because they are improperly constructed for containment in times of heavy rainfall.

Unlined ponds may give good effluent control if dug in impervious clay areas or poor control if in porous, sandy soil. The porous ponds will allow effluent to diffuse into the surrounding earth and water streams. This may or may not be detrimental to the area, but it is certainly poor waste control. Lined ponds are the only answer in these circumstances. Many ponds used today are large low-diked basins. In times of heavy rainfall, much of the pond content is released into either the surrounding countryside or, more likely, into the nearest body of water.

Again, whether this discharge is harmful or not depends on the effluent and the surrounding area, but it does represent poor effluent control and may not be permitted by local, State or Federal authorities.

Good effluent control may be gained by a number of methods, including:

1. Pond and diking should be designed to take any anticipated rainfall - smaller and deeper ponds should be used where feasible.
2. Control ponds should be constructed so that drainage from the surrounding area does not inundate the pond and overwhelm it.
3. Substitution of smaller volume (and surfaced) treatment tanks, coagulators or clarifiers can reduce rainfall influx and leakage problems.

Treatment and Disposal Methods

After the in-process control practices discussed in the previous section have been utilized, treatment is usually required for the contaminated streams. In general, these streams may be divided into one of three categories: cooling water, process water, and ancillary water.

Cooling water, either once-through or recycled by means of a cooling tower, should be relatively free of wastes. Any contaminants present would come from leaks (stream to be sent to emergency pond as soon as control monitoring picks it up) or recycle buildups (cooling tower) which are handled as ancillary water blowdowns. In either event, cooling waste contributions are small and treatment, except for incoming water purification, should not normally be needed.

Process and ancillary waterborne wastes do require treatment. The type, degree and costs involved will depend upon specific circumstances unique for each chemical. Various treatment techniques commonly used in the inorganic chemicals manufacturing industry include settling ponds or vessels, filtrations, chemical treatments, centrifugation, evaporation, drying, and carbon adsorption.

Incoming surface water from streams, lakes, or oceans is often filtered to remove suspended objects and solid particles, chemically treated for clarification (small suspended solids particle removal), controlled for pH and chlorinated for BOD control. Ion exchange is used to replace undesirable calcium, magnesium, carbonate and other ions which plate out on boiler, water tower and process equipment as they are concentrated, aerated or subjected to pH changes.

Waste water streams are often subjected to filtrations to remove minor suspended solids. Screens, cloths, cartridges, bags, candles and other mechanisms are used. The driving force may be gravity, pressure or vacuum. Usually the filters are precoated with diatomaceous earth or other filter aids.

Minor chemical treatments on waste water streams include neutralizations for pH control, equalization of streams in a pond or tank to minimize waste composition fluctuations, and chemical reactions or precipitations to remove undesired components.

Settling ponds or vessels are the major mechanism used for reducing the suspended solids content of water waste streams coming from the plant. Their performance and cost depends on the amount of waste involved and the settling characteristics of the solids suspended. In the lower cost category they are small, reflecting either fast settling and/or small, flow rates.

Costs for the above treatments may, in some cases, be derived in the following sections as extrapolations.

Higher cost treatments are rarely needed for incoming water (except in cases where either only very poor quality water is available or very low TDS is required). They are more applicable for treating waste effluents.

<u>Ion Exchange and Demineralizations</u>

Ion exchange and demineralizations are usually restricted in both practice and costs to total dissolved solids levels of 1000 to 4000 mg/l or less. Table 40 gives water compositions as a function of water treatments, including ion exchange and demineralization.

An ion exchanger may be simply defined as an insoluble solid electrolyte which undergoes exchange reactions with the ions in solution. An exchanger is composed of three components: an inert matrix, a polar group carrying a charge and an exchangeable ion carrying an opposite charge. The inert matrix today is usually a cross-linked polymeric resin containing the needed polar groups.

There are two types of ion exchangers: cation and anion. Cation exchangers contain a group such as sulfonic or carboxylic acid. These can react with salts to give products such as the following:

$$RSO_3H + NaCl = RSO_3Na + HCl$$
$$RCO_2H + NaCl = RCO_2Na + HCl$$

TABLE 40. Raw Water and Anticipated Analyses
After Treatment

Substance		1	2	3	4	5	6	7	8	9
		mg/1 as Ca CO3								
Cations										
Calcium.	Ca++	100	35	58	1	1	-	-	100	100
Magnesium	Mg++	100	58	7	1	-	-	-	100	100
Sodium	Na++	100	100	85	298	164	-	-	100	100
Hydrogen Acidity	H+	0	0	0	C	0	-	-	0	0
Total Cations		300	198	150	300	165	5	5	300	300
Anions										
Bicarbonate)	HCO3-	150	0	0	150	15	-	-	150	150
Carbonate) Alkalinity	CO3--	0	35	21	0	0	-	-	0	0
Hydroxide)	OH-	0	0	0	0	0	-	-	0	0
Phosphate)	PO4---	0	0	0	0	0	-	-	0	0
Anions										
Chloride	Cl-	75	79	64	75	75	-	-	75	75
Sulfate	SO4--	75	79	63	75	75	-	-	75	75
Nitrate	NO3-	0	0	0	0	0	-	-	0	0
Total Anions		300	193	150	300	165	5	5	300	300
Total Hardness		200	93	65	2	1	-	-	200	200
Alkalinity A (Methyl Orange)		150	35	23	150	15	-	-	150	150
Alkalinity B (Phenolphthalein)		0	17	14	0	0	-	-	0	0
Non-Carbonate Hardness		50	58	55	0	0	-	-	50	50
Sodium Alkalinity		0	0	0	150	164	-	-	0	0
		mg/1	mg/1	mg/1	mg/1	mg/1	mg/1	mg/1	mg/1	mg/1
Carbon dioxide	as CO2	30	0	0	30	5-10	5-10	0	30d	30d
Silica	as SiO2	15	A	5	15	15	15	0.02	15	15
Iron & Manganese	as Mn & Fe	10	0.2b	0.2b	0.2	0.2	0.2	0.2	0.2c	0.3
Turbidity		50	0.2b	0.2b	0.2c	0.2c	0.2c	0.2c	0.2c	0.2c
Color		10	10	10	10	10	10	10	10	10
Total Solids (Cations + SiO2)		315	208	155	315	180	20	5	315	315

(continued on next page)

TABLE 40. Raw Water and Anticipated Analyses
After Treatment (cont.)

1. Raw water
2. After cold lime softening and filtration
3. After hot process softening and filtration
4. Ion exchange softening
5. Sodium and hydrogen unit blend and degasification
6. Two-step demineralization (weak anion exchange) and degasification
7. Two-step demineralization (strong base anion resin) and degasification
8. Aeration and filtration
9. Manganese zeolite filters

a. Some reduction will occur
b. Filtered effluent
c. With proper pretreatment
d. Affected by pH adjustment
e. Iron only

Note: Ion exchange processes assume that the water was adequately pretreated.

The above reactions are reversible and can be regenerated with acid.

Anion exchangers use a basic group such as the amino family.

$$RNA_3OH + NaCl \rightarrow RNA_3Cl + NaOH$$

This is also a reversible reaction and can be regenerated with alkalies. The combination of water treatment with both cation and anion exchangers removes the dissolved solids and is known as demineralization (or deionization). The quality of demineralized water is excellent. Table 41 gives the level of total dissolved solids that is achievable. Membrane and evaporation process water contain significantly higher solids content and need final polishing in a demineralizer if less than 3 mg/l dissolved solids level is required for the application. There are many combinations of ion exchangers which can be used for demineralizations.
Four types of demineralization units will be discussed in the cost analysis development to follow:

1. Fixed bed - strong cation - strong anion
2. Fixed bed - strong cation - weak anion
3. Mixed bed demineralizers
4. Special ion exchange systems.

Special ion exchange systems have been developed for concentrating high dissolved solids content (more than 1000 mg/l total dissolved solids), minimizing regenerant chemicals costs. Some of these special systems are listed in Table 42.

Ion exchange is rarely used to concentrate dissolved solids in waste streams unless some specific ion or ions need to be removed. In fact, usually little overall is gained by this technique since regenerations generate wastes that are often as troublesome to dispose of as the original dissolved materials. Also, the cost of treating waste water with a total dissolved solids concentration of only 1000 mg/l is not low. Demineralization can often be used for concentrating wastes.

Chemical Treatment

Chemical treatments for abatement of water-borne wastes are widespread. Included in this overall category are such important subdivisions as neutralization, pH control, precipitations and segregations, harmful and undesirable waste modification and miscellaneous chemical reactions.

a. Neutralization

Most of the inorganic chemicals of this study are either acidic, alkaline or react with water to give acidic or alkaline

TABLE 41. Water Quality Produced by Various Ion Exchange Systems

Exchanger Setup	Residual Silica mg/l	Residual Electrolytes, mg/l	Specific Resistance ohm-cm @ 25°C
Strong-acid cation + weak-base anion	No silica removal	3	500,000
Strong-acid cation + weak-base anion + strong-base anion	0.01-0.1	3	100,000
Strong-acid cation + weak-base anion + strong-acid cation + strong-base anion	0.01-0.1	0.15-1.5	1,000,000
Mixed bed (strong-acid cation + strong-base anion)	0.01-0.1	0.5	1-2,000,000
Mixed bed + first or second setup above	0.05	0.1	3-12,000,000
Similar setup at immediately above + continuous recirculation	0.01	0.05	18,000,000

TABLE 42. Special Ion Exchange Systems

System I

Application: Feedwater with high solids contents (above 1000 mg/l TDS). There are two variations of this system -- two-bed or threebed setup. Two-bed system consists of weak-base (HCO_3) anion + weak-acid (H) cation exchangers followed by a decarbonator unit. NH_4OH and CO_2 are used to regenerate the anion exchanger and sulfuric acid to regenerate the cation exchanger. In place of decarbonate a second weak-base (OH) anion exchanger is used in the three-bed Desal system.

System advantages: high flow rates; carbon dioxide recovery, good regenerant efficiency. Limitations: solids content of water must be less than 2000 mg/l; highly alkaline feedwater needed for best performance; iron in feedwater cannot be tolerated.

System II

Application: Feedwater with high solids content.

Also employs two- or three-bed setup. Two-bed system consists of strong-acid (H) cation + strong-base (SO_4) anion exchangers followed by decarbonator. Sulfuric acid used to regenerate cation exchanger, raw water the anion exchanger. In three-bed system a weak-acid (H) cation exchanger precedes the strong-acid cation exchanger.

Advantages: raw water can be used to regenerate the strongbase anion exchanger; high quality rinse-water not required. Limitations: ratio of SO_4 to Cl in feedwater must be high; requires high volume of rinse water; low capacity.

System III

Application: Feedwater with high solids content.

Four-bed systems consisting of: strong-base anion (HCO_3) + weak-acid cation (H) + strong-acid cation (H) + weakbase anion (OH) exchangers. $NaHCO_3$ is used to regenerate anion exchangers; sulfuric acid to regenerate cation exchangers.

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System III (continued)

Application: (continued)

Advantages: may be used on feedwater containing up to 3000 mg/l solids, content; high capacity and regenerant efficiency. Limitations: number of columns required; low service flow rates; high cost of regenerants.

System IV

Application: Condensate desalination

Mixed-bed ion exchangers have been plagued by the fact that complete resin separation is difficult to achieve -- some cation resin remains mixed with anion resin after backwashing, with the result that sodium is released sooner (lower capacity); some leakage occurs (affecting water quality) since ammonia is usually present in condensate. This is overcome in Ammonex process by regenerating cation exchanger with acid and first regenerating anion exchanger with caustic and then with ammonia to remove the sodium present in anion exchanger.

System V

Application: Condensate desalination

Water quality and run length improved similarly as in Ammonex process except that anion exchanger is regenerated with caustic and lime rather than caustic and ammonia.

System VI

Application: Condensate desalination

Water quality and run length improved by separating mixedbed with strong caustic solution then regenerating beds in customary procedure; i.e., with acid for cation exchanger and caustic for anion exchanger.

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solutions. Others have production wastes or byproducts of acidic or basic nature. Before disposal in surface water or other medium this acidity or alkalinity needs to be reduced and controlled. The most common method is to treat acidic streams with alkaline materials such as limestone, soda ash, sodium hydroxide, and lime. Alkaline streams are treated with acids such as sulfuric. Whenever possible, advantage is taken of the availability of acidic waste streams to neutralize basic waste streams and vice versa.

b. pH Control

The control of pH may be equivalent to neutralization if the pH is adjusted to approximately 7.0. As discussed in the earlier control section, control of excess acidity or alkalinity is best accomplished by pH meter monitoring. The usual acceptable range for pH control is 6.0-9.0 for discharge water.

c. Precipitations and Segregations

The reaction of two soluble chemicals to produce insoluble or precipitated products is the basis for removing many undesired waterborne (and airborne) wastes. The use of this technique varies from lime treatments to precipitate common sulfates, fluorides and carbonates, to sodium sulfide precipitations of mercury, copper, lead and other harmful metals.

d. Modifications

Chemical reactions can also be used to change or destroy undesirable wastes. Among the more common are the oxidation-reduction mechanisms. Cyanides can be oxidized to cyanates; hexavalent chromium reduced to the trivalent form; hypochlorites changed to chlorides; sulfites oxidized to sulfates. These examples and many others are basic to the modification of inorganic chemicals waterborne wastes to make them less troublesome.

Settling Ponds and Vessels

Many chemical treatments produce suspended solids which need to be removed from the waste streams. In the moving, agitated, often turbulent waste streams flowing through pipes, tanks, and channels, there is little opportunity to do this. In fact, it would usually be undesirable to do so in any event -- pipes and flow channels are not easy or economical to clean.

To facilitate settling of suspended solids, large quiet settling ponds and vessels are needed. Settling ponds are the foremost industrial treatment for removing suspended solids.

The size and number of settling ponds differ widely depending on the settling functions required. Waste streams with small suspended solids loads and fast settling characteristics require one or two small ponds with a surface area of less than 0.1-0.2 ha (0.25-0.5 ac). Other waste streams with heavier suspended solids loads and/or slower settling rates may require five to ten ponds and up to 405 ha (1000 ac) total surface area.

Although not as common as settling ponds, tanks and vessels are employed for reduction of suspended solids loads in inorganic chemical production waste streams. Commercially these units are listed as clarifiers or thickeners depending on whether they are light or heavy duty. They also have internal baffles, compartments, sweeps and other directing and segregating mechanisms to provide more efficient performance. This feature, plus the positive containment and control and reduced rainfall influence (smaller area compared to ponds), should lead to increasing use of vessels and tanks in the future.

Filtration (Major)

Major filtration equipment includes pressure and vacuum units of various designs, including plate-and-frame leaf and rotary constructions. Although it is entirely feasible for filtration equipment to be used for removing suspended solids from waste streams, most are not filtered. The preferred treatment for removing suspended solids is settling ponds. Filtrations are common for collection of solid wastes from harmful chemical treatments where complete removal is imperative. Sludges containing metal sulfides (mercury, arsenic, etc.) are good examples of materials handled in this way.

Centrifuging

When the force of gravity is not sufficient to separate solids and liquids to the desired degree, or in the desired time, more powerful centrifugal force can be utilized. Although there are many types of centrifuges, most industrial units can be broken down into two major categories -- solid bowl and perforated bowl. The solid bowl centrifuge, as its name indicates, consists of a rapidly rotating bowl into which the stream with suspended solids is introduced. Centrifugal action of the spinning bowl separates the solids from the liquid phase and the two are removed separately.

The perforated bowl centrifuge has holes in the bowl through which the filtrate escapes by centrifugal force. The solids are retained on the filter inside the bowl and removed either continuously (such as for the pusher types) or in batch fashion.

Centrifuges are not widely used for inorganic chemical waste streams, since it is rare that settling ponds or filters are not adequate for the same suspended solids removal job.

Carbon Adsorption

On the rare occasions that inorganic chemicals waste streams contain organic materials, one of the appropriate treatments to remove these organic components is carbon adsorption. When waste streams containing organic contaminants are passed through activated carbon beds, the organic material is adsorbed. When the carbon bed is saturated with this organic substance, the bed may be regenerated by burning off the adsorbed organic and returning the carbon to service.

Reverse Osmosis

The small pore size of the reverse osmosis membrane is both its strength and its weakness. Its strength comes from the molecular separations that it can achieve. However, it is susceptible to blinding, plugging, and chemical attack. Acidity, suspended solids, precipitations, coatings, dirt, organics and other substances can make it inoperative. Membrane life is critical and difficult to predict in many cases. Because of these restrictions its industrial applications are few. Fortunately, the inorganic chemistry industry water purification needs are similar to those of the areas where reverse osmosis has been shown to be applicable -- treatment of brackish water and low (500-20,000 mg/l) dissolved solids removal. Organics are usually absent, suspended solids are low or can be made low rather easily, acidity is easily adjusted, and most of the dissolved solids are similar to those in brackish water -- sodium chlorides, sulfates and their calcium counterparts.

The reverse osmosis membranes used commercially are generally one of two types -- flat sheet or hollow fiber. For maximum membrane area in the smallest space, various sheet configurations have been devised including tubes, spiral winding, and sandwich-type structures. Sheet membranes have been largely cellulose acetate, while hollow fibers have been largely polyamides. Costs for different membrane configurations are roughly comparable. The type selected depends upon the specific application.

Regardless of membrane type or material, the basic unit of construction is the module (or package of membrane materials). The module is usually integral and of the plug-in type, where a faulty module can be easily (but not inexpensively) replaced. The modules are the heart of the reverse osmosis process, with ancillary equipment such as pumps, tanks, piping, pretreatment facilities and other hardware performing peripheral functions. Module cost alone comprises one-third to one-half of the installed capital investment.

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Detailed cost figures, both capital and operating, are given in Section VIII.

Evaporation Processes

Evaporation is the only method of general usefulness for the separation and recovery of dissolved solids in water. Other processes either involve mere concentration (reverse osmosis) or introduce contaminations for subsequent operations (demineralizer regenerants and chemical precipitations).

The evaporation process is well known and well established in the inorganic chemical industry. Separations, product purifications, solution concentrations are commonly accomplished by evaporative techniques. In-depth technology for handling the common dissolved solids in water waste streams has been developed in the soda ash, salt, calcium chloride, and sea water chemical industries. In addition, numerous desalination plants producing fresh water from brackish or sea water are scattered all over the world and have been in operation for a number of years. Seawater generally has approximately 35,000 mg/l dissolved solids (3.5 percent by weight) while brackish water has 2,000 to 25,000 mg/l depending on location.

Evaporation is a relatively expensive operation. To evaporate one kg of water, approximately 550 kg-calories of energy is required and the capital cost for the evaporating equipment is not low. For these reasons industrial use of evaporation in treating waste water has been minimal. As the cost of pure water has increased in portions of the United States and the world, however, it has become increasingly attractive to follow this approach.

The treatment of water waste streams by evaporation almost always has utilized the principle of multi-effects to reduce the amount of steam or energy required. Thus, the theoretical difficulty of carrying out the separation of a solute from its solvent is the minimum amount of work necessary to effect the particular change, that is the free energy change involved. A process can be made to operate with a real energy consumption not greatly exceeding this value. The greater the concentration of soluble salts, the greater is the free energy change for separation, but even for concentrated solutions the value is much lower than the 550 kg-cal/kg value to evaporate water. Multi-effect evaporators use the heat content of the evaporated vapor stream from each preceding stage to efficiently (at low temperature difference) evaporate more vapor at the succeeding stages. Thus the work available is used in a nearly reversible manner, and low energy requirement results. However, a large capital investment in heat transfer surface and pumps is required. The interaction of the capital equipment costs versus energy or operating costs will be discussed in detail in the treatment costs section.

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Drying

After evaporative techniques have concentrated the dissolved solids to high levels, the residual water content must usually be removed before recovery, sale or disposal. Water content will range from virtually zero up to 90 percent by weight. Gas- or oil-fired dryers, steam-heated drum dryers or other final moisture-removing equipment can be used for this purpose. Since this drying operation is a common one in the production of inorganic chemicals themselves, technology is well known and developed. Costs are mainly those for fuel or steam.

Disposal Practices

Disposal of the waterborne wastes from inorganic chemicals manufacturing represents the final control exercised by the waste producer. A number of options are available. They include discharge to surface water -- river, lake, bay or ocean -- and where safe and permitted, land disposal by running the effluent out on land and letting it soak in or evaporate. Wastes may be disposed of into an industrial waste treatment plant. Treatment and reuse of the waste stream can also be practiced. In dry climates unlined evaporation ponds, if allowed, could be used.

Higher-cost disposal systems include lined evaporation ponds, deep well disposal, and high-cost treatment prior to disposal or recovery. Such methods are used for wastes which cannot be disposed of otherwise. These wastes contain strong acids or alkalies, harmful substances, or large quantities of dissolved solids.

Feasibility, use, and cost figures can be discussed for:

1. unlined evaporation ponds
2. lined evaporation ponds
3. deep wells

Unlined Evaporation Ponds

Two requirements must be met for an unlined evaporation pond to be successfully utilized. First, it must be located in an area in which unlined ponds are allowed, and secondly, the rainfall in that area must not exceed the evaporation rate. This second requirement eliminates most of the heavily industrialized area. For the low rainfall areas, evaporation ponds are feasible with definite restrictions. Ponds must be large in area for surface exposure. Evaporation of large amounts of waste water requires large ponds. The availability and costs of sufficient land place another possible restriction on this approach.

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Lined Evaporation Ponds

The lined evaporation ponds now required in some sections of the country have the same characteristics as developed for the unlined ponds -- large acreage requirements and a favorable evaporation-rainfall balance. They are significantly higher in cost than an unlined pond. Such costs are developed in Section VIII. Reduction of the evaporation load is a significant advantage. For this reason, plus the short supply and high cost of water in much of southwestern United States, distillation and membrane processes are beginning to be used in these regions.

Deep Wells

Deep well disposal can only be used under special conditions consistent with State and Federal regulations. While used for brine disposal in the petroleum and salt industries, deep wells are usually reserved for wastes such as strong acids, chromates, pickle liquor, and corrosive metallic salt solutions for which no other disposal system is available or environmentally acceptable. Deep well disposal should be considered only a temporary expedient until suitable recovery, reuse, or treatment methods are developed and demonstrated to be practical.

There are several reasons for this specialization, including:

1. Costs - A single well costs up to $1,500,000 depending on depth, drilling ease and criticalness, casing, exploration and monitoring involved.

2. Geological - The geological structure in the area is of utmost importance. In many parts of the country, deep wells are not possible. Even in those sections where the geological structure permits their use, deep wells must be carefully planned and coordinated using the best geological information and expertise available.

3. Drilling Considerations - Deep wells are drilled by specialists using oil well technology. While this technology is well developed, there is always the possibility that something expensive will go wrong -- cracks, lost drills, impermeable formations, etc.

4. Reliability - Deep wells often plug or develop operating difficulties even after several years of good performance.

5. Extensive Pretreatment may be necessary to remove organics, suspended solids and other undesirable waste components.

6. The risk of contamination of underground potable water or seismic effects.

Most wells are approximately the same size and range in flow rate from 12.6-56.8 l/sec with the average being about 18.9-25.2 l/sec. This corresponds to approximately 1890 cu m/day capacity.

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SECTION VIII

COST, ENERGY AND NON-WATER QUALITY ASPECTS
COST AND REDUCTION BENEFITS OF TREATMENT AND CONTROL TECHNOLOGIES

The inorganic chemical industry has large energy requirements for gas furnaces, kilns, calciners, electric furnaces, reactors, distillation columns, and evaporators and other common equipment. In contrast, treatment practices consume less than one tenth of one percent of this amount. Chemical reactions and pond settling, the most commonly used treatments, required almost no energy. Filtrations, centrifuging, and other separation techniques are still relatively low energy processes. The only two high energy treatments, evaporation and drying, are now rarely used. Utilizing these treatment techniques to the extent covered in the cost effectiveness discussions later in this section will still maintain treatment energy at a tiny fraction of the total energy for the industry. Table 43 summarizes cost and energy requirements for the manufacture of the inorganic chemicals of this report. To bring the processes to zero water-borne waste effluent through total recycle of process water, rough estimates for additional capital expenditures are 295 million dollars. Of this amount, three industries contribute almost eighty percent. These industries -- soda ash (Solvay Process), chlor-alkali, and titanium dioxide -- have vastly different situations from the other chemicals.

Titanium dioxide has no satisfactory replacement. It can absorb and pass on the large capital and operating costs needed for waterborne waste cleanup. This major clean-up is also long overdue. Development and application of existing treatment technology can save the titanium dioxide industry an estimated 100 million dollars over the full neutralization costs given in Table 43.

The chlor-alkali industry differs from both soda ash (Solvay) and titanium dioxide in that mainly in-process changes and more efficient use of raw materials are required to attain zero water-borne waste. There are many ways to accomplish this, some of which are suggested in Sections VII and VIII of this report.

Other industries that have major capital expenditures in Table 43, sulfuric acid, nitric acid, sodium metal (which is similar in process wastes to chlor-alkali plants), aluminum sulfate, sodium dichromate, and sodium chloride (brine or mining) have these costs primarily because of the large size of the industry or harmful wastes. Except for sodium chloride (brine or mining) and sodium dichromate, all waste abatement costs for these chemicals are below 1.5 percent of the list price.

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TABLE 43. Summary of Cost and Energy Information for Attainment of Zero Discharge

Chemical	Additional Capital, $	Additional Energy 10^6 Btu/yr	Additional Energy 10^6 Kg cal/yr	Incremental Cost $/ton	Incremental Cost $/metric ton	Percent of List Price	June, 1973 List Price $/ton	June, 1973 List Price $/metric ton
Aluminum Chloride	0	0	0	0	0	0	>255	280
Aluminum Sulfate	4,700,000	17,000	4300	0.90	1.0	1.4	62.80	69
Calcium Carbide	0	0	0	0	0	0	171.40	188
Hydrochloric Acid	250,000	0	0	0.05	0.06	0.04	110(100%)121	
Hydrofluoric Acid	1,180,000	3300	8350	13-16	14-18	2.5	560(100%)617	
Lime	0	0	0	0	0	0	19.50- 21.75	21.50- 24
Nitric Acid	11,000,000	0	0	0.22	0.24	0.18	113(100%)124	
Patassium Metal	0	0	0	0	0	0	--	--
Potassium Chromates	90,000	210	53	4.65	5.15	0.97	480	528
Sodium Bicarbonate	0	0	0	0	0	0	88	97
Potassium Sulfate	1,570,000	680,000	162,000	1.60	1.16	3.7	42.50	47.50
Sodium Chloride (Solar)	0	0	0	2.20	2.42	25.9-11.0	8.[illegible]0-20	9.40-22
Sodium Silicate	850,000	332,000	84,000	0.90	1.0	0.95	95	102
Sulfuric Acid	20,000,000	0	0	0.10	0.11	.33	28-32	30.75-35
Hydrogen Peroxide (Organic)	350,000	0	0	1.00	1.10	0.2	460 (70%Sol'n)	505
Sodium Metal	4,700,000	0	0	2.25	2.48	0.6	375	412
Sodium Sulfite	3,730,000	116,000	29,300	2.50	2.75	2.1	117	129
Calcium Chloride	1,040,000	0	0	0.20	0.22	0.5	42	46
Sodium Chloride (brine)	7,750,000	0	0	1.00	1.10	7.15-4.16	14-24	15.40-26.45
Chlor-Alkali	40,000,000	800,000	202,000	0.50	0.45	~0.5	Cl_2 $75	$83
				(combined product basis)			NaOH $110 (75%)	$121
Hydorgen Peroxide (Electrolytic)	15,000	870	220	0.25-.75	0.27-.83	0.1	460 (70%Sol'n)	507

(continued on next page)

TABLE 43. Summary of Cost and Energy Information For Attainment of Zero Discharge (continued)

Chemical	Additional Capital, $	Additional Energy 10^6 Btu/yr	Additional Energy 10^6 kg cal/yr	Incremental Cost $/ton	Incremental Cost $/metric ton	Percent of List Price	June, 1973 List Price $/ton	June, 1973 List Price $/metric ton
Sodium Dichromate	4,100,000	240,000	60,700	16	18	4.6	345	380
Sodium Sulfate	0	0	0	0	0	0	24-33	26-36
Soda Ash	*****25,000,000	200,000	50,200	1.60	1.76	4.5	35.50	39
Titanium Dioxide (Chloride)	****74,000,000	675,000	170,000	64	70	11.4	550-570	605-615
Titanium Dioxide (Sulfate)	96,000,000	535,000	135,000	96	103	17.1	550-570	605-615
Totals	294,895,000	3,590,000	905,000	—	--	—	—	--

*Chemical Marketing Reporter, June 4, 1973.

**Based on 3 million tons/year vacuum pan salt production from Salt, Bureau of Mines Minerals Yearbook, 1969.

***Based on $2.00/ton chlor-alkali production -- estimated from cost effectiveness data in Section VIII

****Based on full neutralization plus demineralization costs as given in Section VIII

*****Based on deep-welling costs as in Section VIII

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For all chemicals except soda ash, titanium dioxide, sodium dichromate, and sodium chloride (solar), the yearly cost for total water-borne waste abatement is less than 4 percent of the current list price.

Energy requirements of 9.05 x 10^{11} kg cal/yr (3.6 X 10^{12} BTU/yr) or the energy equivalent to burning 10,220 cu m (3.6 million gal) of fuel oil for the elimination of water-borne wastes for the chemicals of this study are less than that currently consumed by one large Solvay soda ash plant.

Thermal pollution was not encountered in this study nor was noise or other types of pollutions.

In general, plant size itself does not appear to be a significant factor influencing waste effluents on a kkg waste/kkg of product basis. Multichemical complexes have an advantage over single isolated facilities on costs and options for waste utilization. Plant age does have some influence, with the new plants, naturally, being favored. These are by no means the controlling criteria, however. For example, nineteen exemplary plants used in the cost effectiveness development given later in this section have an average age of 21 years, with five plants of 30 years or greater age and six of 10 years or less age.

Geographical location is often a critical factor for waste disposal costs. Availability of deep welling, ocean barging, or solar evaporation options is an advantage. Also, the western United States has more incentive to recover and reuse ocean water than the east.

New plants being built can avoid major future waste abatement costs by inclusion of:

(1) Dikes, emergency holding ponds, catch basins, and other containment facilities for leaks, spills and washdowns.
(2) Piping, trenches, sewer, sumps and other isolation facilities to keep leaks, spills and process water separate from cooling and sanitary water.
(3) Non-contact condensers for cooling water. Barometric condensers should be avoided.
(4) A full water treatment system, including demineralization, reverse osmosis, evaporative and solids waste handling equipment when needed.
(5) Efficient reuse, recycling and recovery of all possible raw materials and by-products regardless of inherent value. Sodium chloride and sodium sulfate are two by-products which frequently cause trouble.
(6) Closed cycle water utilization whenever possible. Closed cycle operation eliminates all water-borne wastes. Generally, if water is pure enough for discharge, it is pure enough for reuse.

Cost References and Rationales

Cost information contained in this report was obtained directly from industry during exemplary plant visits, from engineering firms and equipment suppliers, and from the literature. The information obtained from these latter three sources has been used to develop general capital, operating and overall costs for each treatment and control method. Costs have been put on a consistent industrial calculation basis of ten year straight line depreciation plus allowance for interest at six percent per year (pollution abatement tax-free money) and inclusion of allowance for insurance and taxes for an overall fixed cost amortization of fifteen percent per year. This generalized cost data plus the specific information obtained from plant visits was then used for the cost effectiveness estimates in this section and whenever else costs are mentioned in this report.

Cost developments, calculations, references and rationale for treatment and disposal techniques pertinent to the inorganic chemicals industry are detailed in Supplement A. In addition to the costs developed in Supplement A, costs for specific plant treatment systems are given in Supplement B. The combination of these two costs sources and engineering judgment extrapolations from them are used for cost effectiveness development.

Definition of Levels of Control and Treatment

Using the general models as given in Figures 62 and 63, cost and energy effectiveness values for each chemical subcategory have been developed. Four levels of treatment and control are considered:

Level A -- Base level practices followed by most of the industry and exceeded by exemplary plants.

Level B -- Treatment and control practices at the average exemplary plant.

Level C -- Based upon the best technically and economically feasible treatment and control technology.

Level D -- Complete water-borne waste elimination. This level may or may not be economically feasible for the specific chemical.

Aluminum Chloride

No water-borne process wastes are generated in the manufacture of aluminum chloride. The only ancillary waste stream results from wet air pollution control devices. Two exemplary plants have no wastes from this source. Plant 125 has been chosen for cost effectiveness development (see Table 44). This is a 30 year old

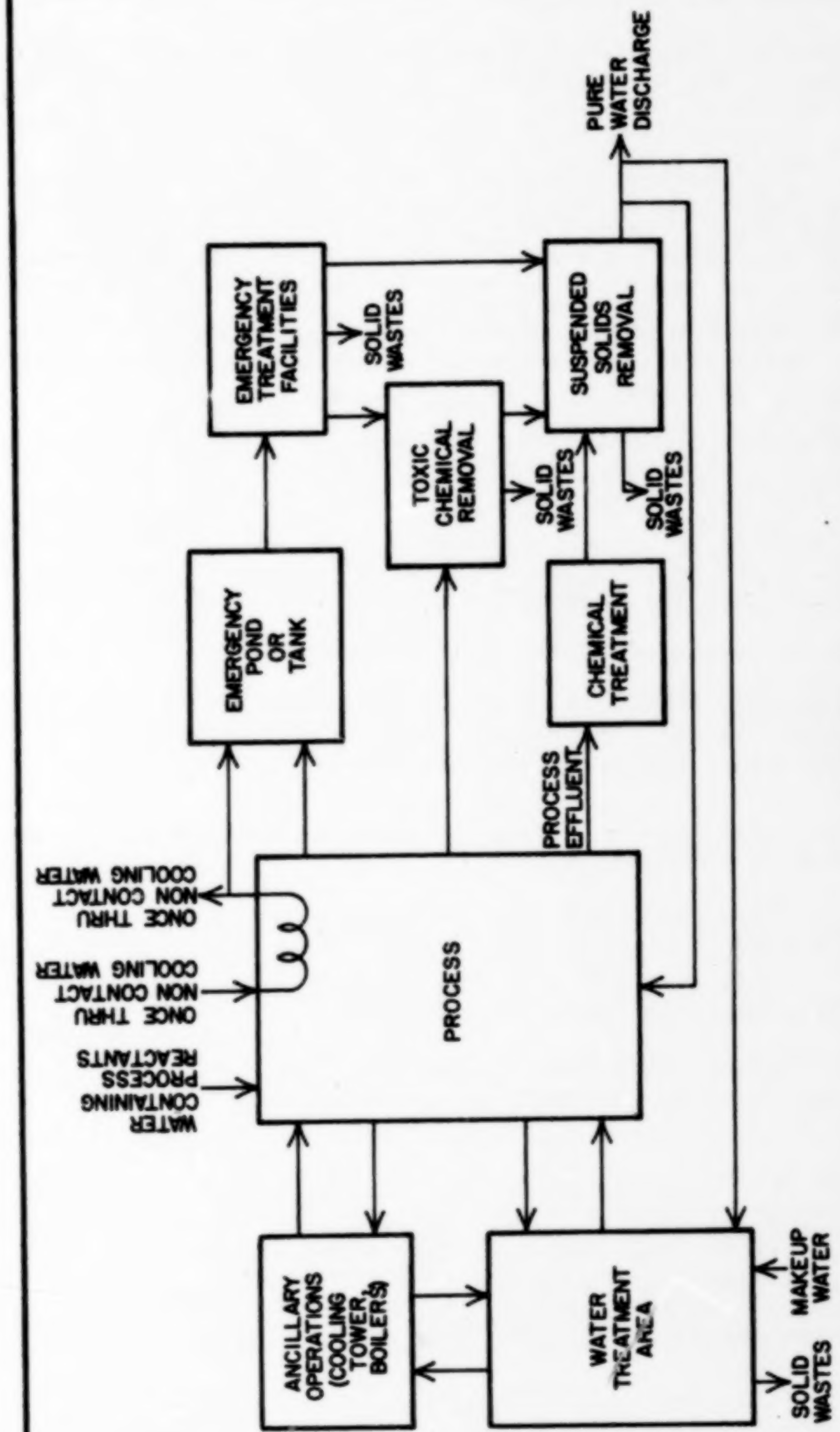

FIGURE 62
MODEL FOR WATER TREATMENT AND CONTROL SYSTEM
INORGANIC CHEMICALS INDUSTRY

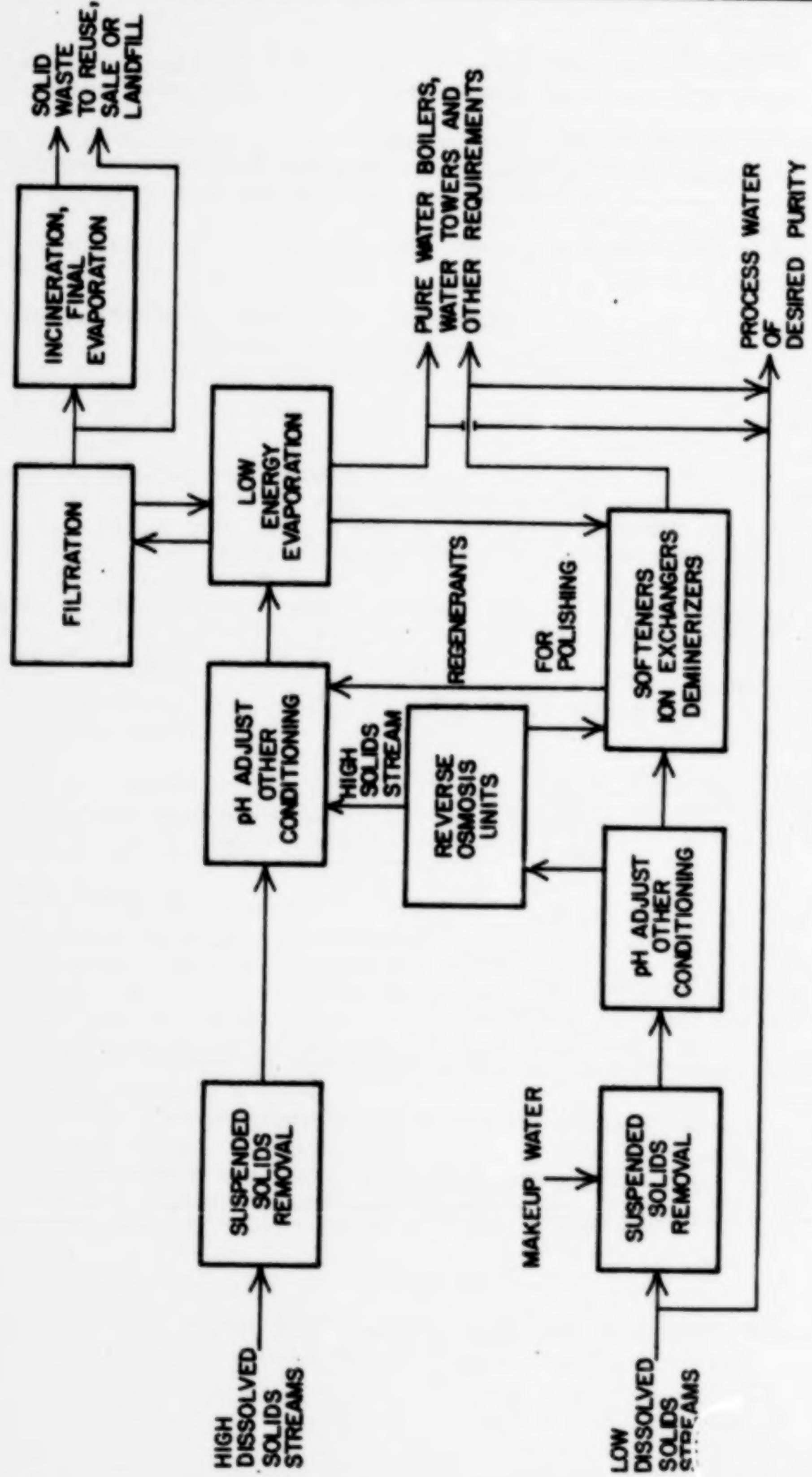

FIGURE 63
MODEL FOR WATER TREATMENT SYSTEM
INORGANIC CHEMICALS INDUSTRY

TABLE 44

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: Aluminum Chloride (22.5 kkg/day (25 tons/day) Capacity)

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A	B	C	D
Investment	25,000	100,000	100,000	100,000
Annual Costs:				
Interest + Taxes and Insurance	1250	5,000	5,000	5,000
Depreciation	2500	10,000	10,000	10,000
Operating and Maintenance Costs (excluding energy and power costs)	2000	0**	0**	0**
Energy and Power Costs	3500	~0	~0	~0
Total Annual Cost	9250	15,000***	15,000***	15,000***

Effluent Quality:

Effluent Constituents Parameters (Units) (kg/kkg (lbs/ton))	Raw Waste Load	Resulting Effluent Levels			
Aluminum Chloride + Chlorine (Airborne)	75(150)*	75(150)*	--------2.5 (5)****------		

Level A - evaporation and reuse
Level B - recycle of scrubber water

*Residual air-borne wastes (where scrubbers are used for air pollution abatement this is water-borne).

**Operating costs of $18,000/yr balanced by sale of product as aqueous aluminum chloride solution.

***Credited to air pollution control water pollution control cost is zero.

****Air-borne waste passing scrubber, scrubber liquor sold or recycled.

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plant of nominal 22.5 kkg/day (25 ton/day) capacity. Treatment facilities have been recently installed.

Energy requirements are low (small pumps and stirrers) and are estimated to be 0.75 kwhr (1 hp-hr). Converting this to common units gives 5.3×10^6 kg cal (2.1×10^7 BTU).

For the entire industry, the energy requirement would be 1.7×10^7 kg cal (6.8×10^7 BTU).

Treatment costs for air pollution control are $1.88/kkg ($1.70/ton) of product. Treatment costs and energy requirements for water pollution control are zero.

Aluminum Sulfate

Two exemplary closed-cycle plants, 049 and 063, were studied. Plant 063 is chosen for cost effectiveness analysis. This 46 year old plant has an average production of 36 kkg/day (40 tons/day). Cost effectiveness information is given in Table 45.

Energy requirements for pumps, clarifiers, drives, etc., are approximately 7.5 kwhr (10 hp-hr). Annual requirements are 5.3×10^7 kg cal (2.10×10^8 BTU).

Entire industry energy for treatment is estimated as 4.3×10^9 kg cal (1.7×10^{10} BTU).

Costs for closed cycle zero effluent operation are $1.87/ kkg ($1.70/ton) of which $1.00/kkg ($0.90/ton) of product represents additional cost above typical operation in all plants.

Calcium Carbide

The calcium carbide manufacturing process generates no water borne waste. The only possible contributions result from wet air pollution control devices used to remove dusts and particulates from the gas streams. Costs for treating air pollution abatement contributions to water effluents are credited to air pollution costs. Therefore, energy and costs for waste water treatment for calcium carbide are zero.

For information purposes, a cost-effectiveness sheet, Table 46, has been prepared showing air pollution abatement costs for plant 190. In this case air pollution control costs are zero since recovered raw materials pay for total annual costs.

Calcium Oxide and Calcium Hydroxide

There is no water-borne waste from the process. Therefore, no cost or energy is involved.

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TABLE 45.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: Aluminum Sulfate (36 kkg/day (40 tons/day) Capacity)

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A	B	C	D
Investment	40,000	100,000		
Annual Costs:				
Interest + Taxes and Insurance	2,000	5,000		
Depreciation	4,000	10,000		
Operating and Maintenance Costs (excluding energy and power costs)	5,000	8,000		
Energy and Power Costs	--	1,000		
Total Annual Cost	11,000	24,000		

Effluent Quality:

Effluent Constituents Parameters (Units) kg/kkg (lbs/ton)	Raw Waste Load	Resulting Effluent Levels			
Silicon Dioxide	20 (40)	1 (2)	0		
Titanium Dioxide	20 (40)	1 (2)	0		
Aluminum Oxide	10 (20)	1 (2)	0		
Aluminum Sulfate	0.25 (0.5)	0.05 (0.1)	0		

A -- Typical treatment taken as pond settling -- total pond area of 0.4 hectare (one acre) (unlined).

B -- Best average treatment level involves clarifiers plus additional ponds + level A ponds and closed cycle operation.

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TABLE 46.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: Calcium Carbide (127 kkg/day (140 tons/day) Capacity)

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A	B	C	D
Investment	0	Not known		
Annual Costs:				
Interest + Taxes and Insurance		Not known		
Depreciation		Not known		
Operating and Maintenance Costs (excluding energy and power costs)	0	Not known		
Energy and Power Costs	0	Not known		
Total Annual Cost	0	0	0	0

Effluent Quality:

Effluent Constituents Parameters (Units) Kg/kg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Coke Dust	50(100)	50(100)	0	0	0
Furnace Dust	85(170)	85(170)	C	0	0
Packing Dust	10(20)	10(20)	0	0	0

Level A -- In many plants there are no dust collectors.

Level B -- Plant 190 installations are expected to pay for themselves in recovered raw material value. Therefore, annual air pollution control cost is zero.

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For informational purposes cost effectiveness Table 47 is given for eliminating air pollution. Cost is \$1.45/kkg (\$1.32/ton) for dry bag collection installations. If water scrubbing plus elimination of water-borne wastes is more economical than \$1.45/kkg (\$1.32/ton) of product, then water scrubbing and reuse may be used.

Calcium Chloride

Calcium chloride comes from two major sources, Solvay soda ash by-product and brine chemicals by-product. A 45 year old, 450 kkg/day (500 ton/day) brine reclamation plant, 185, is used for cost effectiveness development, as shown in Table 48.

Cost for elimination of present wastes is roughly estimated as \$0.22/kkg (\$0.20/ton) of product.

No additional energy requirements are involved.

Chlorine and Potassium or Sodium Hydroxide

a) Mercury cell process

Both chlorine and sodium hydroxide are produced by the mercury cell process. Potassium hydroxide is produced similarly by starting with potassium chloride brine instead of sodium chloride.

Cost effectiveness values are developed in Table 49 using two year-old 158 kkg/day (175 ton/day) (chlorine basis) plant 098.

For zero water-borne wastes the cost above Levels A and B mercury removal is approximately \$1.00/kkg(\$0.90/ton) of chlorine produced. Spreading these costs to chlorine and sodium hydroxide co-products reduces the value to approximately \$0.55/kkg (\$0.50/ton) of products.

Roughly 2.52×10^9 kg cal/yr (1.0×10^{10} BTU/yr) additional energy is required for this plant.

Plants have now reduced water effluent mercury discharges to approximately 0.045-0.225 kg/day (0.1-0.5 lb/day) by spending Level A and B money. Some exemplary plants have spent Level C money (plant 098 is at this level).

b) Diaphragm cell process

Diaphragm cells also produce both chlorine and sodium hydroxide (or potassium hydroxide if potassium chloride brine is used).

Table 50 gives the progressive cost effectiveness development for one year old 2070 kkg/day (2300 ton/day) plant 057. Costs for

TABLE 47

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: Lime - Air Pollution Costs Only (281 kkg/day (310 tons/day) Capacity)

Treatment of Control Technologies Identified under Item III of the Scope of Work:		A	B	C	D
Investment		0	675,000	675,000	675,000
Annual Costs:					
Interest + Taxes and Insurance		0	33,750	33,750	33,750
Depreciation		0	67,500	67,500	67,500
Operating and Maintenance Costs (excluding energy and power costs)		0	35,000	35,000	35,000
Energy and Power Costs		0	2,500	2,500	2,500
Total Annual Cost		0	138,750	138,750	138,750
Effluent Quality:					
Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Kiln Dusts	67(134)	67(134)	~0	~0	~0

Level B -- Dry bag collectors installed.

TABLE 48.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Calcium Chloride (450 kkg/day (500 tons/day) Capacity)**

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A*	B	C	D
Investment	0	200,000	200,000	200,000
Annual Costs:				
Interest + Taxes and Insurance	0	10,000	10,000	10,000
Depreciation	0	20,000	20,000	20,000
Operating and Maintenance Costs (excluding energy and power costs)	0	0	0	0
Energy and Power Costs	0	0	0	0
Total Annual Cost	0	30,000	30,000	30,000

Effluent Quality:

Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Calcium Chloride	30(60)	30(60)	0.5(1)	~0	~0
Sodium Chloride	0.5(1)	0.5(1)	0	~0	~0
Ammonia	0.5(1)	0.5(1)	0	~0	~0

Level A -- Normally these wastes, as dissolved solids are discharged to surface water in non-exemplary of soda ash plants.

Level B -- Replacement of barometric condensers with non-contact heat exchangers.

Level C -- Elimination of packing station water-waste contributions.

*Level A corresponds to present performance of "exemplary" plant in this table. Level B modelled to near future plans of this plant.

TABLE 49

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Mercury Cell Chlor-Alkali (158 kkg/day (175 tons/day) Capacity)**

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A	B	C	D
Investment	500,000	500,000	700,000	750,000
Annual Costs:				
Interest + Taxes and Insurance	25,000	25,000	35,000	37,500
Depreciation	50,000	50,000	70,000	75,000
Operating and Maintenance Costs (excluding energy and power costs)	55,000	55,000	61,000	64,000
Energy and Power Costs	1,000	1,000	2,000	7,000
Total Annual Cost	131,000	131,000	168,000	183,500

Effluent Quality:

Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Sodium Chloride	50(100)	50(100)	50(100)	70(140)	~0
Sodium Hypochlorite	20(40)	20(40)	20(40)	~0	~0
Mercury	<0.05(<0.1)	$<1 \times 10^{-3}$ ($<2 \times 10^{-3}$)	$<7 \times 10^{-5}$ ($<1.4 \times 10^{-4}$)	$<7 \times 10^{-5}$ ($<1.4 \times 10^{-4}$)	~0

Level A -- Reduction of mercury to less than 1×10^{-3} kg/kkg.

Level B -- Reduction of mercury to less than 7×10^{-5} kg/kkg.

Level C -- Level B + catalytic conversion of sodium hypo chlorite to sodium chloride. Plant 098 is at this level.

Level D -- Level C + evaporation and reuse of sodium chloride. No effluent except cooling water from system. Drying sulfuric acid to other use or concentration.

TABLE 50.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Diaphragm Cell, Chlor-Alkali (1810 kkg/day (2000 ton/day) Capacity)**

Treatment of Control Technologies Identified under Item III of the Scope of Work:		A	B	C	D
Investment		45,000	65,000	495,000*	1,500,000
Annual Costs:					
Interest + Taxes and Insurance		2,250	3,250	3,250	75,000
Depreciation		4,500	6,500	6,500	150,000
Operating and Maintenance Costs (excluding energy and power costs)		24,000	224,000	224,000	224,000
Energy and Power Costs			1,000	1,000	1,000
Total Annual Cost		30,750	234,750	234,750	450,000
Effluent Quality:					
Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Calcium Carbonate sludge	12.25(24.5)	0	0	0	0
Sodium Hypochlorite	7.5(15)	7.5(15)	7.5(15)	0	0
Spent Sulfuric Acid	4(8)	4(8)	0	0	0
Chlorinated Hydrocarbons	0.7(1.4)	0.7(1.4)	0	0	0
Sodium Chloride	25.5(51)	25.5(51)	5(10)	5(10)	0
Sodium Hydroxide	22(44)	22(44)	4.5(9)	4.5(9)	0

Level A -- Settling Pond.

Level B -- Chlorinated hydrocarbons to disposal pit + sulfuric acid to sales, neutralization of sodium hydroxide and brine returned to system.

Level C -- Installation of chlorine burning hydrochloric acid plant for chlorine tail gas. Hydrochloric acid value equal to cost.

Level D -- Non-contact cooling substituted for barometric condensers - rough estimate.

*Cost of installation -- 0 contribution to cost -- see Level C note.

attaining no discharge of process waste water pollutants are proximately $0.55/kkg ($0.50/ton) of product. For new facilities the cost would be considerably less, since non-contact condensers should be used in place of barometric condensers.

Additional energy requirements are negligible.

Hydrochloric Acid

During normal operation the chlorine-burning hydrochloric acid manufacturing process has no water-borne wastes. Startup wastes are less than 0.5 kg/kkg (1.0 lb/ton) of product and are typically neutralized in sodium hydroxide solutions. Cost effectiveness information is given in Table 51 using plant 121 as a model. Addition of a small sodium hypochlorite destruction vessel plus a pump and transfer line for reuse in the chlor-alkali eliminates the process waste water discharge from the process. Total cost for zero effluent attainment is $0.33/kkg ($0.30/ton) of product, while the incremental cost for going from typical to zero effluent treatment levels is $0.055/kkg ($0.05/ton). Additional energy requirements are negligible.

Hydrofluoric Acid

Hydrofluoric acid production, like that of the other mineral acids, generates a very low water-borne waste load. Good engineering, maintenance and housekeeping reduces the waste effluent to 0.5 kg/kkg (1.0 lb/ton) or less. A complete recycle zero discharge plant (152) of 27 kkg/day (30 ton/day) capacity and 15 years age, is chosen for cost effectiveness calculations as given in Table 48, column 4 (alternate B).

The large cost differential between Level C and Level B shows that two different approaches make a substantial difference in the costs involved. Plant 011 follows stoichiometric use of sulfuric acid, thereby eliminating $30,000 neutralization chemical costs per year. It handles calcium sulfate and calcium fluoride dry by hauling to a land dump, thereby eliminating pond settling and dredging costs for another $70,000/yr differential. In-process changes account, therefore, for a $7.70/kkg ($7/ton) difference in treatment costs.

Total cost to achieve no discharge of process waste water pollutants from plant 011 is $17.60/kkg ($16/ton) and for plant 152 is $14.30/kkg ($13/ton). The greatest portion of this cost is for handling and disposal of solid calcium sulfate, which has to be done in all plants.

Additional energy required for going from base level treatment to closed cycle operation is negligible. An additional 7.5 kw-hr (10 hp-hr) is allowed for pumping from collection ponds back to the system. This gives 5.3 x 10^7 kg cal (2.10 x 10^8 BTU) or

TABLE 51:

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Hydrochloric Acid (36 kkg/day (40 tons/day) Capacity)**

Treatment of Control Technologies Identified under Item III of the Scope of Work:		A	B*	C	D
Investment		10,000	10,000	15,000	15,000
Annual Costs:					
Interest + Taxes and Insurance		500	500	750	750
Depreciation		1,000	1,000	1,500	1,500
Operating and Maintenance Costs (excluding energy and power costs)		2,000	2,000	2,000	2,000
Energy and Power Costs		~0	~0	~0	~0
Total Annual Cost		3,500	3,500	4,250	4,250
Effluent Quality:					
Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Chlorine & Hydrogen Chloride	0.5(1)	0.75(1.5)	0.75(1.5)*	0	0

Levels A and B -- Neutralization in sodium hydroxide solution followed by discharge to surface water.

Levels C and D -- Destruction of sodium hypochlorite in small pond or vessel and use of sodium chloride solution in chlor-alkali system. Chlorine-burning hypochloric acid units are always located in chlor-alkali complexes.

*This corresponds to exemplary plant operation with wastes only during startup. Level I guideline recommendation modelled to C.

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TABLE 52.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Hydrofluoric Acid (36 kkg/day (40 tons/day) Capacity)**

Treatment of Control Technologies Identified under Item III of the Scope of Work:		A	B*	C	Alternate B**
Investment		0	30,000	50,000	75,000
Annual Costs:					
Interest + Taxes and Insurance		0	1,500	2,500	3,750
Depreciation		0	3,000	5,000	7,500
Operating and Maintenance Costs (excluding energy and power costs)		50,000	52,000	60,000	165,000
Energy and Power Costs		~0	~0	1,000	5,000
Total Annual Cost		50,000	56,500	68,500	181,250
Effluent Quality:					
Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Calcium Sulfate	3650(7300)	0	0	0	0
Sulfuric Acid	110(220)	0	0	0	0
Calcium Fluoride	62.5(125)	0.5(1)	0.25(0.5)	0	0
Hydrogen Fluoride	2.5(5)	2.5(5)	0.25(0.5)	0	0
Hydrofluorosilicic Acid	12.5(25)	12.5(25)	0	0	0
Silicon Dioxide	12.5(25)	12.5(25)	0	0	0

Level A -- Land dumping of calcium sulfate, minimizing acid by operating near stoichiometry requirements. Costs are all for trucking of calcium sulfate, calcium fluoride and contained sulfuric acid to land dump.

Level B -- Similar to Exemplary Plant 011 of this study.

Level C -- Closed loop extension of 011.

*Exemplary plant operation, Level I guideline recommendation based on modelling to Level C, or equivalent to alternate Level B.

**Exemplary closed loop plant 152 (27 kkg/day).

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795/l/yr (210 gal/yr) of fuel oil. Total industry additional energy requirements are 8.30 x 10^8 kg cal (3.3 x 10^9 BTU).

Hydrogen Peroxide

a) Organic process

The waste water effluent resulting from the manufacture of hydrogen peroxide by the organic process contains waste hydrogen peroxide plus an organic solvent. The nature of this solvent is regarded as a trade secret.

Cost effectiveness information is developed in Table 53 for exemplary plant 069, a twenty year old, 85 kkg/day (94 ton/day) facility.

Estimated additional cost to attain zero waste discharge is approximately $1.10/kkg ($1.00/ton) of hydrogen peroxide.

Additional energy requirements are negligible.

b) Electrolytic process

Hydrogen peroxide may be produced using an electrolytic process. Twenty year old plant 100 serves as the basis for the cost effectiveness information shown in Table 54.

Elimination of the process waste water discharge from this plant would cost approximately $0.28 to $0.83/kkg ($0.25 to $0.75/ton) of product produced.

Additional energy required would be 2.2 x 10^8 kg cal (8.7 x 10^8 BTU).

Nitric Acid

There is no water-borne waste from the nitric acid manufacturing process, nor is there usually any contribution from air pollution treatment equipment. Only leaks, spills, monitoring and containment costs are involved.

For seven year old, 281 kkg/day (310 ton/day) plant 114, there are no effluent waste streams except boiler and cooling tower blowdowns. These are over 378,500 l/day (100,000 gal/day) in volume. Ancillary streams, however, are excluded from process waste water guidelines. Since no cost figures are available for nitric acid, they are estimated to be the same as those for sulfuric acid isolation and containment, $160,000. Applying this cost to the 288 kkg/day (320 ton/day) plant gives $0.24/kkg ($0.22/ton) cost for isolation and containment of leaks and spills. No energy addition is involved.

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TABLE 53'.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Hydrogen Peroxide (Organic Process) (85 kkg/day (94 tons/day) Capacity)**

Treatment of Control Technologies Identified under Item III of the Scope of Work:		A	B*	C	D
Investment		23,000	53,000	200,000	0
Annual Costs:					
Interest + Taxes and Insurance		1,150	2,650	10,000	10,000
Depreciation		2,300	5,300	20,000	20,000
Operating and Maintenance Costs (excluding energy and power costs)		3,000	3,000	5,000	5,000
Energy and Power Costs		~0	~0	~0	~0
Total Annual Cost		6,450	10,950	35,000	35,000
Effluent Quality:					
Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Organics	0.25(0.5)	0.1(0.2)	0.025(0.05)	0	0
Hydrogen Peroxide	20(40)	5(10)	5(10)	0	0

Level A -- Reduction of hydrogen peroxide with scrap iron, organics removal by mechanical separation.

Level B -- Level A + improved organics removal and spill containment.

Level C -- Closed loop process water, non-contact cooling water only effluent.

***Not exemplary plant, modeled.**

5830

TABLE 54.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: Hydrogen Peroxide - Electrolytic (12 kkg/day (13.2 ton/day) Capacity)

Treatment of Control Technologies Identified under Item III of the Scope of Work:		A	B	C	D
Investment		-	12,500	15,000	
Annual Costs:					
Interest + Taxes and Insurance		-	625	750	
Depreciation		-	1,250	1,500	
Operating and Maintenance Costs (excluding energy and power costs)		-	1,600	2,000	
Energy and Power Costs		-	~0	1,000	
Total Annual Cost		-	3,475	5,250	
Effluent Quality:					
Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Sodium Sulfate	0.75(1.5)	0.75(1.5)	0.75(1.5)	~0	
Ammonium Sulfate	0.75(1.5)	0.75(1.5)	0.75(1.5)	~0	

Level A -- There is no typical plant.
Level B -- Present plant operation
Level C -- Distillation to dryness 1136 liters/day (300 GPD)

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Potassium Metal

There are no process, air pollution or ancillary water wastes involved in the production of potassium metal.

Potassium Chromates

Potassium dichromate is made from the reaction of sodium dichromate with potassium chloride. There is none of the massive ore waste present as in the sodium dichromate process. The only water-borne wastes from the exemplary 25 year old, 13.5 kkg/day (15 ton/day) plant 002 are from once-through cooling water used on the barometric condensers. Replacement of these condensers with non-contact heat exchangers, as planned for 1974, will eliminate the discharge of process waste water pollutants from this plant. Cost for this conversion is estimated at $60,000. See Table 55.

The treatment differential in going from base Level A to zero discharge costs $5.12/kkg ($4.65/ton) of potassium dichromate.

Energy requirements for pumps, filters, centrifuges, and other equipment are taken as 7.5 kw-hr (10 hp-hr) or 5.3×10^{7} kg cal/yr (2.1×10^{8} BTU/yr). Entire industry additional energy is estimated at the same value.

Potassium Sulfate

The treatment and control cost effectiveness values for potassium sulfate based on plant 118 are developed in Table 56.

Costs for going from base treatment to zero effluent is $2.38/kkg ($2.16/ton) of potassium sulfate.

There is a relatively high energy recovery process with 6.7×10^{10} kg cal (2.65×10^{11} BTU) or 1,000,000 l (265,000 gal) of fuel oil energy per year. For the entire industry the additional energy requirement is 1.72×10^{11} kg cal (6.8×10^{11} BTU).

Sodium Bicarbonate

Water-borne wastes from sodium bicarbonate facilities are small. Using plant 166 as a model, cost effectiveness values are developed in Table 57. Reducing the bicarbonate wastes to zero should be virtually cost free since current product losses should cover expenses.

There are no significant new energy requirements.

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TABLE 55.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: Potassium Chromate (13.5 kkg/day (15 tons/day) capacity)

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A	B*	C	D
Investment	20,000	50,000	110,000	110,000
Annual Costs:				
Interest + Taxes and Insurance	1,000	2,500	5,500	5,500
Depreciation	2,000	5,000	11,000	11,000
Operating and Maintenance Costs (excluding energy and power costs)	0	10,000	10,000	10,000
Energy and Power Costs	0	1,000	1,000	1,000
Total Annual Cost	3,000	18,500	27,500	27.500

Effluent Quality:

Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Sodium Chloride	400(800)	400(800)	0	0	0
Filter Aid	0.85(1.7)	~0.05(~0.1)	0	0	0
Potassium Dichromate	~0.5(~1)	~0.5(~1)	~0.5(~1)	~0	~0

Level A -- Discharge of all water to settling pond to remove filter aid.

Level B -- Centrifuge, filter, pumps, piping and installation for sodium chloride and filter aid removal. Salt value has been assumed zero.

Level C -- Non-contact heat exchangers installed.

*Exemplary plant, Level I guidelines recommendations modelled to Level C, plans for 1974 for exemplary plant.

TABLE 56.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Potassium Sulfate (454 kkg (500 tons) per day Capacity)**

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A	B	C	D
Investment	40,000	700,000	700,000	700,000
Annual Costs:				
Interest + Taxes and Insurance	2,000	35,000	35,000	35,000
Depreciation	4,000	70,000	70,000	70,000
Operating and Maintenance Costs (excluding energy and power costs)	10,000	124,000	124,000	124,000
Energy and Power Costs	~0	166,000	166,000	166,000
Total Annual Cost	16,000	395,000	395,000	395,000

Effluent Quality:

Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Ore Muds	15(30)	0	0	0	0
Waste Liquor	2000(4000)	2000(4000)	0	0	0

Level A -- Pond settling of muds. Discharge of dissolved solids to surface water.

Level B -- Evaporation to recover liquor chemicals and water + Level A value of recovered chemicals not deducted from costs. Water value is also not deducted.

TABLE 57.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Sodium Bicarbonate (272 kkg/day (300 ton/day) Capacity)**

Treatment of Control Technologies Identified under Item III of the Scope of Work:		A	B	C	D
Investment		10,000	15,000	15,000	15,000
Annual Costs:					
Interest + Taxes and Insurance		500	750	750	750
Depreciation		1,000	1,500	1,500	1,500
Operating and Maintenance Costs (excluding energy and power costs)		1,000	2,000	2,000	2,000
Energy and Power Costs		~0	~0	~0	~0
Total Annual Cost		2,500	4,250	4,250	4,250
Effluent Quality:					
Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Sodium Carbonate	30(76)	38(76)	38(76)	0	0
Sodium Bicarbonate	10(20)	10(20)	0	0	0
Rubbish	<2.5(<5)	0	0	0	0

Level A -- Settling pond, landfill for rubbish, discharge to surface water.

Level B -- Redissolve broken bags and waste sodium bicarbonate + Level A.

Level C -- Recycle sodium carbonate to Solvay Process system. Value obtained equal cost.

*Exemplary plant plans to go to Level C in near future, hence Level I guidelines recommendations were modelled to Level C.

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Sodium Carbonate

The Solvay process produces approximately 1370 kg (3000 lb) of dissolved solid wastes for every kkg (ton) of product. These solids consist of slightly over 0.91 kkg (1.0 ton) of calcium chloride, which has high solubility, is difficult to obtain in anhydrous form, and spontaneously picks up moisture from the air when land dumped, and about 0.45 kkg (0.5 ton) of unreacted sodium chloride, also highly soluble.

Although there is a market for calcium chloride, this market can be supplied with 10 to 15 percent of the calcium chloride available from Solvay plants alone. Therefore, most of the available calcium chloride must be disposed of at zero value or less (disposal costs). The sodium chloride can be reused if it can be separated from the calcium chloride and other wastes, but the value of this raw material is low and recovery is uneconomical. Therefore, half a dozen Solvay plants discharge more waste to surface water than any other chemical subcategory and there is no general economically feasible treatment scheme to eliminate the discharge of these wastes. Costs are given below for Solvay process plant 166. This 2520 kkg/day (2800 ton/day), over 75 year old facility, is used for cost developments.

Treatment and Control Method	Capital Costs $	Annual Cost $
1. Coproduction of ammonium chloride with soda ash	34,000,000	26,000,000
2. Ammonia and hydrogen chloride from ammonium chloride	133,000,000	45,000,000
3. Ammonia and chlorine from ammonium chloride	80,000,000	34,000,000
4. Deep well disposal	6,000,000	1,600,000
5. Total evaporation plus ocean barging of solid wastes	51,000,000	31,000,000

Options 1, 2, and 3 are process changes or additions with high capital investments. The quantities of ammonium chloride, hydrogen chloride and chlorine produced either exceed the current demand or would be such major contributors that the market structure would be drastically altered. The other two options are disposal methods.

The only economically feasible disposal options for Solvay process soda ash wastes today are partial recovery of calcium chloride for sales or deep welling. Since the Solvay soda ash wastes are similar to those for brine salts and oil well salts, which are extensively deep-welled, a good case can be made for such disposal, if geologically feasible at the plant location (or close by). However, deep-well disposal may be practiced only under strictly regulated conditions, consistent with State and Federal laws.

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Cost effectiveness values are developed using these two technologies in Table 58.

Additional costs for zero discharge of wastes to surface water are approximately \$0.55/kkg (\$0.50/ton) of product. For deep-welling disposal alone, costs for zero waste effluent are \$1.76/kkg (\$1.60/ton) produced. Additional energy requirements, primarily for calcium chloride recovery, are high. Estimated requirements for plant 166 are 3.15×10^{11} kg cal/yr (1.25×10^{12} BTU/yr) or for the entire industry 1.26×10^{12} kg cal/yr (5.0×10^{12} BTU/yr). Without calcium chloride recovery, about 1.25×10^{10} kg cal/yr (5.0×10^{12} BTU/yr) for plant 166 or 5.0×10^{10} kg cal/yr (2.0×10^{11} BTU/yr) for the industry, would be needed for deep welling.

Sodium Chloride

a) Solar evaporation process

It has been recommended that concentrated magnesium-rich residual brines or bitterns from solar salt manufacture be stored and eventually recovered for their chemical value. Taking Plant 059 as a model, cost effectiveness values are developed in Table 59.

One 146 ha (360 ac) pond is needed each year. While this storage capacity is available for the next five to ten years, obviously it cannot go on indefinitely. Use of these valuable mineral deposits should be made in the near future. Storage costs for solar salt bitterns for Plant 059 are \$2.42/kkg (\$2.20/ton) of product.

Additional energy requirements are negligible.

b) Solution brine-mining process

Unlike the solar salt industry where all wastes are stored or disposed of in surface ponds, salt producers using the brine-mining process get their salt from underground deposits and return most wastes to the mine deposit.

Exemplary plant 030, a 49 year old, 1,000 kkg/day (1,100 ton/day) facility is used for cost effectiveness developments in Table 60. Complete elimination of process wastes in the plant effluent would cost, for a new plant, approximately \$0.28/kkg (\$0.25/ton) of product. This assumes plant 030 technology plus initial installation of non-contact final condensers. Conveying and packing losses may recovered dry and either reused or land (or well) disposed.

Elimination of all but 1 kg/kkg (2 lb/ton) waste from plant 030 would cost approximately \$0.55/kkg (\$0.50/ton) of product.

TABLE 58.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: Soda Ash (2520 kkg/day (2800 tons/day) Capacity)

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A	B	C	D
Investment	500,000	21,500,000	27,500,000	27,500,000
Annual Costs:				
Interest + Taxes and Insurance	25,000	1,075,000	1,375,000	1,375,000
Depreciation	50,000	2,150,000	2,750,000	2,750,000
Operating and Maintenance Costs (excluding energy and power costs)	375,000	3,175,000	3,675,000	3,675,000
Energy and Power Costs	-	800,000	1,000,000	1,000,000
Total Annual Cost	450,000	(1,080,000) Profit	520,000	520,000

Effluent Quality:

Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Calcium Chloride	1100(2200)	1100(2200)	900(1800)	0*	0*
Sodium Chloride	500(1000)	500(1000)	500(1000)	0*	0*
Calcium Carbonate	85(170)	~0	~0	0*	0*
Calcium Oxide	135(270)	25(50)	25(50)	0*	0*
Calcium Sulfate	31(62)	2.5(5)	2.5(5)	0*	0*
Ash and cinders	40(80)	~0	~0	0*	0*
Silicon Dioxide	585(117)	~0	~0	0*	0*

Level A -- Settling ponds

Level B -- Level A + evaporation of 20% of stream to recover calcium chloride for sale at \$44/kkg (\$40/ton) -- 8,280,000 value.

Level C -- Level B + deep well disposal.

*No surface water effluent.

TABLE 59.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Solar Salt (2540 kg/day (2800 tons/day) Capacity)**

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A	B	C	D
Investment	14,400,000	14,400,000	14,400,000	14,400,000
Annual Costs:				
Interest + Taxes and Insurance	720,000	720,000	720,000	720,000
Depreciation	1,440,000	1,440,000	1,440,000	1,440,000
Operating and Maintenance Costs (excluding energy and power costs)	~0	~0	~0	~0
Energy and Power Costs	~0	~0	~0	~0
Total Annual Cost	2,160,000	2,160,000	2,160,000	2,160,000

Effluent Quality:

Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Bitterns	70,000(140,000)	0	0	0	0

Level A -- 1 new 360 acre unlined pond per year is needed. Costs are taken from Section VIII for unlined ponds.

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TABLE 60.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Sodium Chloride (Brine/Mining) (1000 kkg/day (1100 ton/day) Capacity**

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A	B	C	D
Investment	-	500,000	1,000,000	600,000
Annual Costs:				
Interest + Taxes and Insurance	-	25,000	50,000	30,000
Depreciation	-	50,000	100,000	60,000
Operating and Maintenance Costs (excluding energy and power costs)	-	10,000	10,000	10,000
Energy and Power Costs	-	~0	~0	~0
Total Annual Cost	-	85,000	160,000	100,000

Effluent Quality:

Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Sodium Chlorine	50(100)	-	6(12)	1(2)	~0
Brine Sludge	2.5(5)	-	0	0	~0

Level A -- No information.

Level B -- Plant 030 technology, sludge returned to wells. Control system developed including \$425,000 damming, curbing, collection and pumping to wells, and \$63,000 instrumentation and miscellaneous pumps and piping.

Level C -- Level B + non-contact heat exchangers for barometric condensers.

Level D -- For new plants. Elimination of conveying and packing station losses peculiar to Plant 030.

5840

Negligible additional energy would be required.

Sodium Dichromate

The sodium dichromate manufacturing process produces a waste stream containing high concentrations of suspended and dissolved solids primarily because of the chromium treatment process used. Two year old 149 kkg/day (164 ton/day) plant 184 is used as the model for cost effectiveness development as shown in Table 61.

Additional cost above typical treatment is $17.60/kkg ($16/ton) of product, of which $13.20/ ($12/ton) is already being spent in exemplary plant 184. Evaporation to recover dissolved salts costs $4.40/kkg ($4/ton) of product. Selling price of sodium dichromate is $380/kkg ($345/ton).

These figures illustrate the high cost of isolating, containing, treating and disposing harmful wastes. They also show that if the effluent streams can be kept small, 1,317 cu m/day (348,000 gal/day) in this case, removal of dissolved salts by evaporation is expensive, but not prohibitively so.

It is believed that, while the isolation, containment and treatment facilities of exemplary plant 184 are exceptional, there are more economical ways of achieving the same degree of chromium reduction.

Additional energy requirements are estimated to be 2.5 x 10^{10} kg cal (1.0 x 10^{11} BTU) per year for plant 184. For the industry, using similar treatment (which is doubtful) to to eliminate the discharge of process waste water pollutants, the additional yearly energy requirements would be 6.05 x 10^{10} kg cal (2.4 x 10^{11} BTU).

Sodium Sulfate

Sodium sulfate is a by-product of sodium dichromate and other manufacturing processes. As such, no water-borne wastes are attributed to its production. Therefore, it is considered to be a zero effluent-zero treatment and control chemical with no additional energy requirements.

Sodium Metal

Sodium metal and chlorine are produced as coproducts in the Downs Cell process. Since the chlorine produced is handled similarly and has the same wastes as the mercury and diaphragm cell processes, only wastes specific to the Downs Cell and sodium production are included here. Table 62 gives the estimated cost effectiveness values for a 58 kkg/day (65 ton/day) fourteen year old plant (096).

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TABLE 61.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Sodium Dichromate (149 kkg/day (164 tons/day) Capacity)**

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A	B	C	D
Investment	100,000	1,000,000	1,800,000	1,800,000
Annual Costs:				
Interest + Taxes and Insurance	5,000	5,000	90,000	90,000
Depreciation	10,000	100,000	180,000	180,000
Operating and Maintenance Costs (excluding energy and power costs)	~0	560,000	610,000	610,000
Energy and Power Costs	~0	4,000	64,000	64,000
Total Annual Cost	15,000	669,000	944,000	944,000

Effluent Quality:

Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Total Suspended Solids	900(1800)	0.125(0.25)	0.125(0.25)	~0	~0
Total Dissolved Solids	88.5(177)	88.5(177)	88.5(177)	~0	~0
Chromium 6	-	-	0.0001(0.0002)	~0	~0

Level A -- Settling pond.
Level B -- Segregation and chemical treatment for chromium-6. Pond settling and discharge of clear effluent to surface water.
Level C -- Level B + evaporation to recover dissolved sodium chloride. Recovered sodium chloride costed as zero value. Closed loop operation.

5842

TABLE 62.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Sodium Metal (58 kkg/day (6$tons/day) Capacity)**

Treatment of Control Technologies Identified under Item III of the Scope of Work:		A	B	C	D
Investment		0	400,000	700,000	0
Annual Costs:					
Interest + Taxes and Insurance		0	20,000	35,000	35,000
Depreciation		0	40,000	70,000	70,000
Operating and Maintenance Costs (excluding energy and power costs)		4,000	4,000	10,000	10,000
Energy and Power Costs		~0	~0	~0	~0
Total Annual Cost		4,000	64,000	115,000	115,000
Effluent Quality:					
Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Sodium Chloride	57.5(115)	57.5(115)	57.5(115)	~0	~0
Misc. Alkaline Salts	30(60)	30(60)	30(60)	~0	~0
Bricks, Anodes, Other Solids	$\leq$2.5($\leq$5)	0	0	0	~0

Level A -- Disposal of salts plus solids.
Level B -- Facilities for separating salts from solids.
Level C -- Containment, isolation and return of salts to brine system.

Costs for plant 096 to attain a zero water-borne waste effluent are \$2.47/kkg (\$2.25/ton) of sodium above initial expenditures of \$3.30 to \$4.40/kkg (\$3 to \$4/ton) of sodium, which is currently selling for \$412/ kkg (\$375/ton).

Additional energy costs should be negligible.

Sodium Silicate

The wastes from the sodium silicate manufacturing process are relatively small and closed loop operation has been achieved in plant 072.

For the purpose of developing cost effectiveness data plant 134 has been selected for Table 63 calculations. This plant is a ten year old, 72 kkg/day (80 ton/day) facility. Control and treatment costs are approximately \$1.00/kkg (\$0.90/ton) of product.

Additional energy costs using this approach are 3.5 x 10^{9} kg cal (14 x 10^{10} BTU). For the total industry, additional energy requirements are 8.4 x 10^{10} kg cal (3.32 x 10^{11} BTU).

A second approach using only Level A treatment and closing the loop bypasses both the energy requirements and most of the cost. This approach is used in plant 072. Treatment costs for this approach would be approximately \$0.22/kkg (\$0.20/ton) of product.

Costs for both approaches are reasonable. In view of the energy advantage for plant 072's approach, this recycle method should be favored.

Sodium Sulfite

The wastes from the sodium sulfite processes are essentially sodium sulfite. Table 64 gives the cost effectiveness values for plant 168, a fifteen year old installation.

Costs for reducing the waste water discharge from plant 168 to zero are approximately \$2.75/kkg (\$2.50/ton) of product. If recovery of sodium sulfite is directed at the same stream which is now treated and directly discharged, there is a potential for \$25,000/yr profit. Plants not now treating or recovering sodium sulfite should explore this approach.

Additional energy required is approximately 1.62 x 10^{9} kg cal/yr (6.4 x 10^{9} BTU/yr) or 24,200 l (6400 gal) of fuel oil /yr. For the entire industry this would be 2.92 x 10^{10} kg cal (1.16 x 10^{10} BTU).

TABLE 63.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Sodium Silicate (72 kkg/day (80 tons/day) Capacity)**

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A	B*	C*	D
Investment	26,000	42,000	62,000	62,000
Annual Costs:				
Interest + Taxes and Insurance	1,300	2,106	3,100	3,100
Depreciation	2,600	4,200	6,200	6,200
Operating and Maintenance Costs (excluding energy and power costs)	1,000	9,000	10,000	10,000
Energy and Power Costs	~0	--	10,000	10,000
Total Annual Cost	4,900	15,300	29,300	29,300

Effluent Quality:

Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
		A	B	C	D
Sodium Silicate	2(4)	2(4)	2(4)	0	0
Sodium Sulfate	2.5(5)	2.5(5)	2.5(5)	0	0
Filter Aids	2(4)	0	0	0	0
Sand	0.5(1)	0	0	0	0
Sodium Hydroxide	0.5(1)	0.5(1)	0	0	0

Level A -- Settling pond only.
Level B -- Settling pond plus neutralization (existing good plant).
Level C -- Evaporation to remove and recover dissolved solids + Levels A and B treatment. Sodium silicate recovered (exemplary plant).

*Note Level C is exemplary plant level in this table.

TABLE 64.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Sodium Sulfite (45 kkg/day (50 ton/day) Capacity)**

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A	B	C	D
Investment	0	250,000	275,000	150,000
Annual Costs:				
Interest + Taxes and Insurance	0	12,500	13,750	7,500
Depreciation	0	25,000	27,500	15,000
Operating and Maintenance Costs (excluding energy and power costs)	0	10,000	12,000	5,000
Energy and Power Costs	0	2,000	7,000	6,000
Total Annual Cost	0	49,500	47,750	(25,000) Profit

Effluent Quality:

Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
		A	B	C	D
Sodium Sulfate	-	-	29(58)	0	0
Sodium Sulfite	30.5(61)	30.5(61)	1.5(3)	0	0

Level A -- No treatment -- typical for industry.
Level B -- Full treatment system, but dissolved solids still discharged.
Level C -- Level B + evaporation recovery and sales of recovered product. Product value $12,500.
Level D -- Isolation and containment parts of complete system of Level B + evaporation to recover sodium sulfite. Product value is $58,500.

Sulfuric Acid

The sulfuric acid (sulfur-burning) manufacturing process has no process wastes. The only water-borne wastes result from leaks, spills, air pollution control equipment, and ancillary operations such as cooling tower blowdowns and ion-exchange regenerants. Since cooling tower blowdowns and ion-exchange regenerants are not considered to be process waste water, they are not included here. Air pollution control equipment costs are presented for informational purposes.

Regen plants for making sulfuric acid from waste or spent acid are not covered in this study but are included in cost effectiveness development for informational purposes.

Exemplary sulfur-burning plant 141, a three year old, 360 kkg/day (400 ton/day) plant, was used as the model in Table 65.

Costs are less than $0.10/kkg ($0.10/ton) of product. Additional energy is negligible.

Titanium Dioxide

a) Chloride process

Most chloride processes for titanium dioxide production use either rutile or "synthetic rutile" ore. One plant uses lower-grade ores but for the purposes of this cost effectiveness discussion, this process is considered to be on-site beneficiation plus a "synthetic rutile" process.

Currently, chloride process wastes are treated or disposed of by complete neutralization, deep-welling and ocean barging. For companies already ocean barging, cost run $5.50 - $11 kkg ($5 to $10 per ton) of titanium dioxide product. For those starting barging a location further from the ocean, or requiring extensive shore facilities, the costs may range from $11 to $22/kkg ($10 to $20/ton).

Deep-welling costs run from $2.20 to $5.50/kkg ($2 to $5/ton) of titanium dioxide product. Complete neutralization, on the other hand, is much more expensive. Table 66 shows the cost effectiveness development for this approach using ten year old 67 kkg/day (74 ton/day) exemplary plant 009 as the model.

Complete neutralization which is now done by plant 009 costs $40/kkg ($36/ton) differential over base treatment Level A.

Reduction to virtually zero discharge of wastes costs $71/ kkg ($64/ton) of product. Titanium dioxide sells for $605 to $627/kkg ($550 to $570/ton).

Additional energy costs are roughly estimated to be 1.3 x 10^{10} x 10^{10} kg cal (5.0 x 10^{10} BTU) for plant 009 and 1.7 x 10" kg cal

TABLE 65.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Sulfuric Acid (Sulfur Burning)(360 kkg/day (400 tons/day) Capacity)**

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A	B	C	D
Investment	50,000	100,000	160,000	160,000
Annual Costs:	2,500	5,000	8,000	8,000
Interest + Taxes and Insurance	5,000	10,000	16,000	16,000
Depreciation	~0	~0	~0	~0
Operating and Maintenance Costs (excluding energy and power costs)	~0	~0	~0	~0
Energy and Power Costs	7,500	15,000	24,000	24,000
Total Annual Cost				

Effluent Quality:

Effluent Constituents Parameters (Units) kg/kkg(Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Spills, Leaks	1(2)	0.5(1)	0	0	0

Closed Cycle System

Level A -- Typical diking and containment.

Level B -- Good isolation and containment + Level A.

Level C -- Lined containment emergency pond -- 0.4 hectare (1 acre) + Level A and B.

TABLE 66.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Titanium Dioxide (Chloride Process), 67 kkg (74 ton) per day basis**

Treatment of Control Technologies Identified under Item III of the Scope of Work:		A	B	C	D
Investment		300,000	4,000,000	5,300,000	5,300,000
Annual Costs:					
Interest + Taxes and Insurance		15,000	200,000	265,000	265,000
Depreciation		30,000	400,000	530,000	530,000
Operating and Maintenance Costs (excluding energy and power costs)		10,000	390,000	890,000	890,000
Energy and Power Costs		~0	10,000	45,000	45,000
Total Annual Cost		55,000	1,000,000	1,730,000	1,730,000
Effluent Quality:					
Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Iron Hydroxides	65(130)	65(130)	~0	~0	~0
Other metal oxides	65(130)	65(130)	~0	~0	~0
Ore	138(276)	~0	~0	~0	~0
Titanium hydroxides	25(50)	29(58)	~0	~0	~0
Hydrochloric Acid	227(454)	227(454)	~0	~0	~0
Titanium Dioxide	40.5(81)	~0	~0	~0	~0
Coke	23(46)	~0	~0	~0	~0
Soluble Chlorides and sulfates	-	-	315(630)	~0	~0

Level A -- Pond settling.
Level B -- Complete chemical treatment facility + land dumping of solid waste.
Level C -- Level B + specialty unit demineralization + evaporation of regenerant solution.
Level D -- Same as Level C.

(6.75×10^{11} BTU) for the entire industry using the same treatment.

b) Sulfate process

The sulfate process for producing titanium dioxide has the heaviest water-borne waste load per ton of product of all the processes of this study. Of the approximately three kkg waste/kkg of product, two kkg are sulfuric acid. The model plant used is plant 142, a twenty-seven year old 108 kkg/day (120 ton/day) facility Cost effectiveness is developed in Table 67.

Additional costs in going from typical Level A to virtually complete elimination of water-borne wastes are $106/kkg ($96/ton) or 10.5¢/kg (4.8¢/lb) of titanium dioxide produced. Going to Level C costs $90/kkg ($82/ton) or 9.0¢/kg (4.1¢/lb).

This is compared to $8.80 to $11.0/kkg ($8 to $10/ ton) for ocean barging of strong acid wastes. Adding Level B costs of approximately $11/kkg ($10/ton) to this gives about $22/kkg ($20/ton) for removal of acidity and the largest portion of the wastes. Ocean barging, as mentioned for the chloride process, can range for new plants (or old plants not now using this disposal means) up to $33/kkg ($40/ton) or $44/kkg ($40/ton) overall waste costs. Thus, ocean barging costs about one-fourth to one-half that of complete neutralization.

Acid recovery is another attractive approach. Using a current EPA-support pilot plant as model for acid recovery, cost effectiveness is developed in Table 68. Additional costs for this approach are $53/kkg ($48/ton) of titanium dioxide produced for practically zero water-borne waste eliminating Level D. Without demineralization, additional costs above Level A are $37.50/kkg ($34/ton) or about onehalf that for complete neutralization.

Required additional energy for complete neutralization plus demineralization and evaporation of regenerant is 4.15×10^{10} kg cal/yr (4.0×10^{9} BTU/yr) for plant 142 and 1.35×10^{11} kg cal/yr (5.35×10^{11} BTU/yr) for the industry (sulfate process).

Similar values for acid recovery are 1.6×10^{11} kg cal (6.3×10^{11} BTU) for plant 142 and 1.32×10^{12} kg cal (5.2×10^{12} BTU) for the industry.

TABLE 67.

Water Effluent Treatment Costs

Inorganic Chemicals

Chemical: **Titanium Dioxide (Sulfate Process), 108 kkg (120 ton) per day basis**

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A	B	C	D
Investment	100,000	150,000	11,200,000	11,500,000
Annual Costs:				
Interest + Taxes and Insurance	5,000	7,500	560,000	575,000
Depreciation	10,000	15,000	1,120,000	1,150,000
Operating and Maintenance Costs (excluding energy and power costs)	65,000	400,000	2,220,000	2,350,000
Energy and Power Costs	~0	~0	11,000	45,000
Total Annual Cost	80,000	422,500	4,011,000	4,120,000

Effluent Quality:

Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Sulfuric Acid	2025(4050)	2025(4050)	1745(3490)	~0	~0
Iron Sulfate	387(774)	387(774)	370(740)	~0	~0
Aluminum Sulfate	270(540)	270(540)	260(520)	~0	~0
Magnesium Sulfate	220(440)	220(440)	210(420)	~0	~0
Other metal suflates	35(70)	35(70)	35(70)	~0	~0
Solid Wastes	210(420)	20(40)	20(40)	~0	~0
Soluble Calcium Sulfate	-	-	-	265(530)	~0

Level A -- Settling Pond

Level B -- Level A + neutralization of weak acid stream.

Level C -- Full neutralization.

Level D -- Level C + specialty system demineralization + evaporation of regenerant solution.

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TABLE 68.

Water Effluent Treatment Costs (Acid Recovery Option)

Inorganic Chemicals

Chemical: **Titanium Dioxide (Sulfate Process), 108kkg (120/ton) per day basis**

Treatment of Control Technologies Identified under Item III of the Scope of Work:	A	B	C	D
Investment	100,000	150,000	4,000,000	5,500,000
Annual Costs:				
Interest + Taxes and Insurance	5,000	7,500	200,000	275,000
Depreciation	1,000	15,000	400,000	550,000
Operating and Maintenance Costs (excluding energy and power costs)	65,000	400,000	500,000	850,000
Energy and Power Costs	~0	~0	400,000	445,000
Total Annual Cost	71,000	422,500	1,500,000	2,120,000

Effluent Quality:

Effluent Constituents Parameters (Units) kg/kkg (Pounds/Ton)	Raw Waste Load	Resulting Effluent Levels			
Sulfuric Acid	2025(4050)	2025(4050)	1745(3490)	~0	
Iron Sulfate	387(774)	387(774)	370(740)	~0	~0
Aluminum Sulfate	270(540)	270(540)	260(520)	~0	~0
Magnesium Sulfate	220(440)	220(440)	210(420)	~0	~0
Titanium Sulfate	180(360)	180(360)	130(260)	~0	~0
Other metal sulfates	35(70)	35(70)	35(70)	~0	~0
Solid Wastes	210(420)	20(40)	20(40)	~0	~0
Soluble Calcium Sulfate	-	-	-	~200(~400)	~0

Level A -- Settling Ponds

Level B -- Level A + weck acid stream neutralization.

Level C -- Level B + acid recovery facilities.

Level D -- Level C + specialty system demineralization + evaporation of regenerant solution.

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Summarizing the costs for rough comparison purposes gives:

Method	Cost/kkg (Cost/ton) Titanium Dioxide
Ocean barging and weak acid neutralization	$22 ($20)
Acid recovery	$44 ($40)
Total neutralization	$88 ($80)

Overlaps in costs can occur depending on specific circumstances. Since most of the neutralization products are insoluble calcium sulfate and metallic oxides and hydroxides, the complete neutralization of sulfate process wastes is a relatively "clean" process. Also, its simple tested technology reliability is attractive. Acid recovery is still in the development stage for the process described. Corrosion problems are the biggest current uncertainty. The cost of this approach is one-half that of complete neutralization, however, and there is no reason why technology know-how can not be brought to bear on this process.

GENERAL INFORMATION ON COST OF CONTROL AND TREATMENT SYSTEMS

Segregation of contaminated water streams from non-contaminated streams is the first step in water-borne waste abatement. Since the treatment costs normally depend on the volume of water to be treated more than the amount of waste, keeping the waste water volume small reduces costs and energy requirements. Spills, leaks and washdowns are small, but need to be contained and isolated.

Cost for segregation and containment vary depending on the size and complexity of the plant, volume and nature of the wastes, and the equipment employed.

Estimates of these costs based on information obtained from plant visits are given below. In general, small chemical plants produce 50 tons/day or less of product. However, this may vary significantly with the particular chemical.

Isolation of wastes containing mercury and chromium costs approximately $200,000 to $300,000. Large salt, acid and chlor-alkali plants also fall in a similar price range for isolation and containment costs. Older plants may be more difficult and expensive to modify than new facilities.

Isolation and Containment Costs

Purpose	Installations	Small Plants	Large Plants
Isolation	Trenches and sewers pipelines, sumps, catch basins, tanks and pumps	$ 10,000-100,000	$100,000-300,000
Containment	Dikes and curbing	$ 5,000-50,000	$ 50,000-200,000
Isolation	Non-contact heat-exchangers	$ 50,000	$100,000-500,000

Barometric condensers are the most common source of cooling water contamination. Barometric condensers are now being replaced by non-contract heat exchangers in various inorganic chemical plants.

Chemical Treatment Systems

Equipment Costs

These systems, consisting of chemical reactors, clarifiers, thickeners, and filters or centrifuges, are designed as integral units for complete waste treatment. Installed equipment costs for chemical treatment systems as a function of capacity are summarized below:

Capacity cu m/day (gal/day)	Reaction Tanks, $	Clarifiers and Thickeners, $	Filters or Centrifuges, $	Total* Costs $
38 (10,000)	15,000	15,000	25,000	60,000
379 (100,000)	25,000	40,000	25,000	150,000
3785 (1,000,000)	37,500	75,000	200,000	500,000
37850 (10,000,000)	50,000	200,000	750,000	2,000,000

*Includes engineering, land preparation, and installation. Does not include land cost, storage tanks and disposal facilities, or other auxiliary equipment.

These costs are for light slurry loads. For heavy slurry loads, such as for titanium dioxide wastes, overall costs are several times greater.

Chemical Costs

The costs for chemical treatments cannot be generalized. Most of the chemicals used, however, are for neutralizations. Chemical treatments costs depend on the chemical used and the amount

required, which varies with the particular situation. The unit cost of the chemical is usually known. Whenever feasible, neutralization of alkaline wastes is done with sulfuric acid. As shown in Table 69, sulfuric acid costs only 30 to 40 percent as much as hydrochloric and nitric acid. In other words, a dollars worth of sulfuric acid will neutralize 2.5 to 3.5 times as much alkalinity as a dollars worth of the other two acids. Cost for sulfuric acid is approximately $33/kkg ($30/ton).

Limestone and lime are commonly used to neutralize acidic waste streams. Limestone is the lower cost material at $7-11/kkg ($6-10/ton); but suffers the disadvantage of slower reaction, high impurities, and lower obtainable pH. Lime costs are approximately $22/kkg. Ammonia and sodium hydroxide are far more expensive than lime or limestone, with 50 percent sodium hydroxide at $121/kkg ($110/ton) (100 percent basis), it can be seen why lime is preferable in most cases.

For small usage or where solubility or character of precipitate is important, caustic soda or ammonia may still be employed.

Neutralizations with waste acids or bases can change the whole cost structure. Waste sulfuric acid is often available at either no cost or the cost of freight. Waste lime, caustic soda or ammonia can sometimes be obtained at similar low costs.

Costs for neutralizations and other chemical reactions are simply determined for special applications by multiplying the cost/weight of the neutralizing or reacting chemical by the weight stoichiometrically required. Where specific experience is available, it may have been found that 10 to 20 percent excess over stoichiometric quantities are needed. In rare cases, several-fold excesses may be used to ensure complete reaction.

Settling Ponds and Vessels

Ponds for storage, emergency discharge and containment, settling of suspended solids, or solar evaporation, are the most commonly employed treatment and control facility in the inorganic chemical industry. Two categories, unlined ponds and lined ponds, are summarized in the tables and figures of this section.

A third category, tanks and vessels such as thickeners and clarifiers, are not widely used at present in the inorganic chemical industry as contrasted to other chemical industries and sanitary treatment facilities. As land becomes more costly and unavailable and treatment and control requirements change, open tanks and vessels may see increased use. Cost information on equipment of this type has already been given in the chemical treatment section.

TABLE 69. Comparison of Chemicals for Waste Neutralization

Alkaline Wastes		Relative	kg*** Req'd/kkg Alkali**		
Neutralizing Material		Chemical Cost*, $	$CaCO_3$	$Ca(OH)_2$	NaOH
Sulfuric Acid	(50° Be)	1.00	1260	1700	1580
Hydrochloric Acid	(20° Be)	2.57	2320	3140	2500
Nitric Acid	(39.5° Be)	3.51	2100	2840	2630

Acid Wastes		kg*** Req'd/kkg Acid**		
Neutralizing Material	Cost*, $	H_2SO_4	HCl	HNO_3
Lump limestone, high Ca	1.16	1100	1480	860
Lump limestone, dolomitic	1.00	940	1270	730
Pulv. limestone, high Ca	1.59	1100	1480	860
Oulv. limestone, dolomitic	1.37	940	1270	730
Hydrated lime, high Ca	3.06	790	1070	620
Hydrated lime, dolomitic	2.50	650	870	510
Pebble lime, high Ca	2.07	600	800	460
Pebble lime, dolomitic	1.87	540	730	420
Pulv. quicklime, high Ca	2.18	600	800	460
Pulv. quicklime, dolomitic	1.97	540	730	420
Sodium bicarbonate	20.65	1730	2330	1350
Soda ash	13.08	1190	1600	930
Caustic soda (50%)	9.96	1640	2200	1270
Ammonia (anhyd.)	5.90	350	470	270
Magnesium oxide	3.90	420	560	330

*Delivered cost including freight.

**Commodity weight.

***To convert numbers to lbs. req'd/100 lbs alkali or acid, multiply x 0.1.

Unlined Ponds

The costs of constructing unlined ponds differ widely depending on the circumstances. Since they cover large areas, the cost of the land itself is a factor. Building a 200 hectare (500 ac) pond on prime industrial land may cost $1 to 5 million just for the land itself. No provision is made in this analysis, however, for such costs. It is assumed that the land value is not a large portion of the cost. For small ponds of less than 4 to 20 ha (10 to 50 ac) and land values of $250 to $625/ha ($100 to $250/ac), this assumption is good, as will be seen from the magnitude of the other costs.

Construction costs vary widely depending on the circumstances. Use is often made of natural pits, valleys, ponds, lakes, etc., for minor alterations, such as damming, dike building and leveling. Excavation is easier in some localities than others.

Pond size is also a major cost factor. Small ponds may be dug and the excavated dirt used for dikes. Large ponds are usually diked or dammed.

Assuming equal depths of two ponds, one large and one small, the volume increases as the square while the dike length (and earth moving) is increasing only linearly. Therefore, costs will be developed for small ponds and then for large ones.

Small pond capital costs are given in Figure 64.

Large pond costs developed from reference (27) are shown in Figure 65. Undoubtedly, many of these installations made use of natural topography (lakes, basins, etc.) to avoid as much excavation as possible. Nevertheless, the general cost levels and trends may be seen. As would be expected from the diking costs varying by the square root of the area, the pond costs per hectare above 200 ha (500 ac) change very slowly.

Lined Ponds

To avoid excessive liquid seepage, ponds are often lined with clay, concrete or other substances. Recently, however, new lining materials have come into use -- rubber and plastic sheeting.

Essentially, costs for pond construction are the same as for unlined ponds except for the sheeting material and installation. Therefore, the costs may be estimated by adding the installed liner costs to the previously determined costs for unlined ponds. The material costs for the lining range from $1.00 to $6.00/sq m (10¢ to 60¢/sq ft), depending on the material selected and the thickness of the sheet. (30) Although thicknesses as low as 250 microns (10 mils) have been discussed, (31) the most used thickness appears to be 750 micron (30 mils). For 750 micron (30 mils) PVC liners, the installed cost is approximately $2.00/sq m.

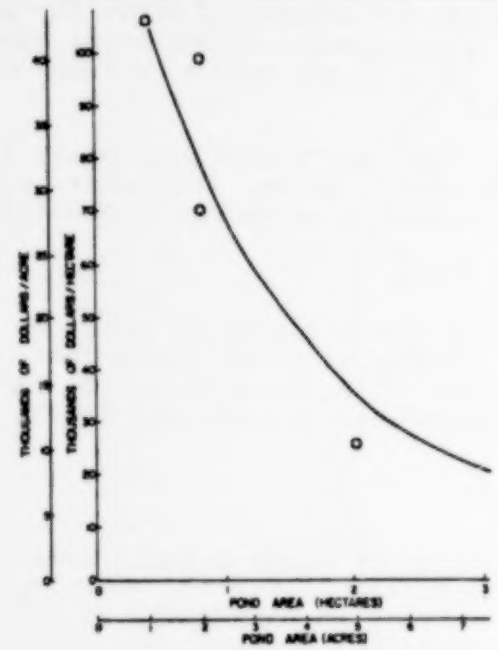

FIGURE 64
CAPITAL COSTS FOR SMALL UNLINED PONDS
(REFERENCE (28), (29), AND (30))

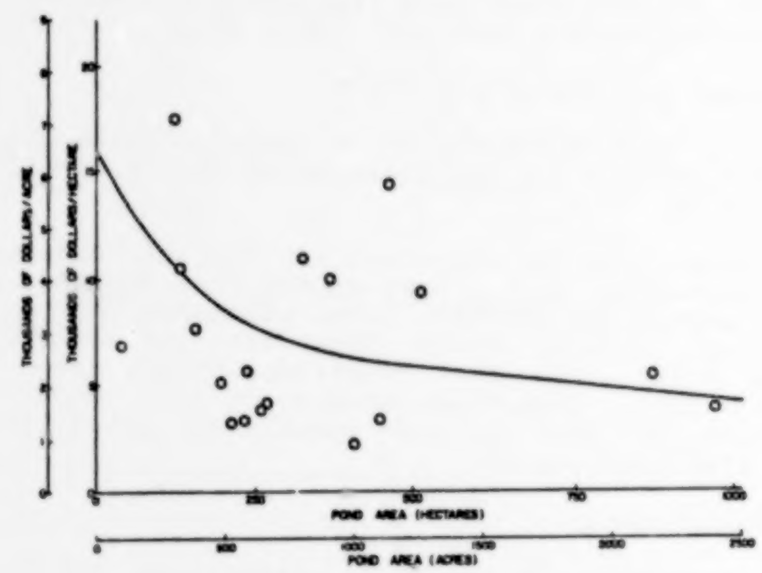

FIGURE 65
CAPITAL COSTS FOR LARGE UNLINED PONDS
(REFERENCE (27))

The construction costs for small lined ponds are given in Figure 66. These values may be conservative as far as film costs are concerned. For large ponds, lined costs have been estimated by adding $2.00/sq m (20¢/sq ft) to the unlined costs. The results are shown in Figure 67.

Since a 200 ha (500 ac) lined pond costs $4 to 6 million this approach for large scale waste treatment and/or storage will require careful investigation before proceeding.

Solar Evaporation Ponds

Table 70 gives the costs for solar ponds as a function of evaporative capacity. Table 71 gives costs per 3785 liters (1000 gallons) calculated from Table 70 for comparison with treatment costs for other processes. A pond and liner life of 20 years was assumed.

Carbon Adsorption

There are a few instances where organic materials are present in the inorganic chemicals industry water wastes. These organic materials may be handled in many cases by conventional biological digestion or they may be treated by methods such as carbon adsorption.

Installation costs range from 5¢ to 20¢/3785 l (1000 gal) treated. A cost of 15¢ was chosen as representative. This cost includes 5 percent loss of efficiency upon carbon regeneration.

Combining capital costs from Figures 68 and operating costs from above, yields overall treatment costs as shown in Figure 69.

Ion Exchange and Demineralization

Ion-exchange and demineralization water treatments are widely used, particularly for pretreatment of boiler, cooling tower, and process feeds.

Ion exchange, as its name implies, replaces undesired ions with less objectionable ones. Some of the ions removed in this way include magnesium, calcium, iron, manganese, carbonate, nitrate, and sulfate. Usually these ions are replaced by sodium or chloride ions. The total quantities of dissolved solids remain almost the same. Demineralizations, on the other hand, by a combination of ion exchange operations, actually remove almost all the dissolved solids.

Ion Exchange Costs

Ion exchange units are generally restricted to treating waste waters with low concentrations of dissolved solids. Two common

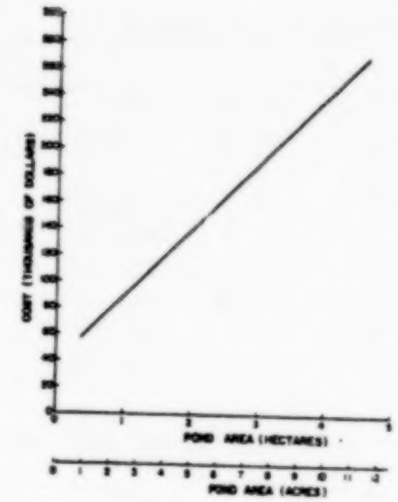

FIGURE 66
CONSTRUCTION COST OF SMALL LINED PONDS
(REFERENCE (30))

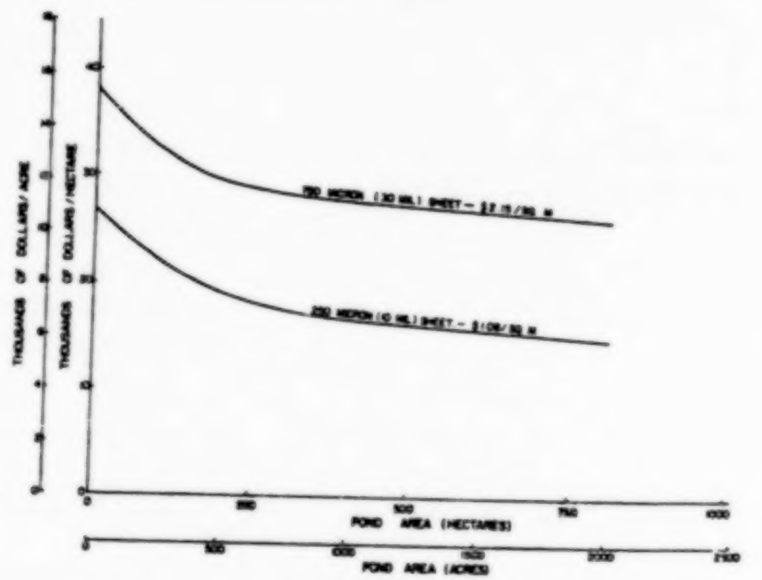

FIGURE 67
CAPITAL COSTS FOR LARGE LINED PONDS

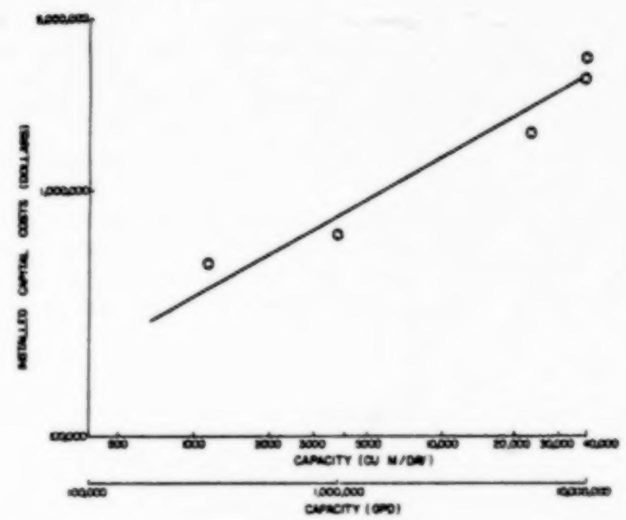

FIGURE 68
INSTALLED CAPITAL COST FOR
CARBON ADSORPTION EQUIPMENT

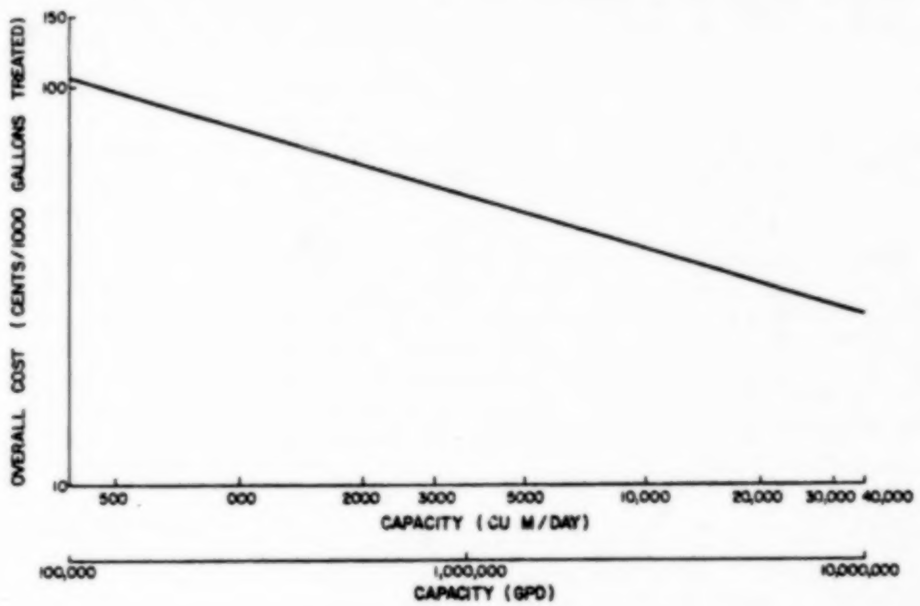

FIGURE 69
OVERALL COSTS FOR CARBON ADSORPTION

TABLE 70. Capital Costs for Lined Solar Evaporation Ponds as a Function of Capacity*

	Evaporation--Rainfall Differential					
	2 Ft.		4 Ft.		6 Ft.	
Capacity cu m/day (GPD)	Hectare (Acres)	Capital Costs	Hectare (Acres)	Capital Costs	Hectare (Acres)	Capital Costs
38 (10,000)	2.2 (5.6)	150,000	1.1 (2.8)	95,000	0.8 (1.9)	80,000
189 (50,000)	11.2 (28)	420,000	5.6 (14)	212,000*	3.7 (9.3)	220,000*
378 (100,000)	22 (56)	820,000	11.2 (28)	470,000	7.5 (18.7)	282,000
945 (250,000)	56 (140)	1,960,000	28 (70)	1,010,000	18.7 (46.7)	690,000
1890 (500,000)	112 (280)	3,700,000	56 (140)	1,960,000	37.3 (93.3)	1,350,000
3785 (1,000,000)	220 (560)	6,650,000	112 (280)	3,700,000	74.8 (187)	2,570,000

*Ponds of 10 acres and under tanke from Figure 74; those over 10 acres taken from Figure 75.

TABLE 71. Costs for Solar Evaporative Pond Disposal

	20-Year Pond Life		
	Cost, ¢/3785 liters (¢/1,000 Gal.) Evaporation-Rainfall Differential		
Evaporative Capacity cu m/day (GPD)	2 ft/yr	4 ft/yr	6 ft/yr
38 (10,000)	214	136	114
379 (100,000)	117	67	40
3785 (1,000,000)	95	53	37

treatment methods are: (1) Sodium-hydrogen zeolite dealkalizers (2) Zeolite softeners

Estimated costs of ion-exchange operations as a function of dissolved solids concentration are shown below:

Total Dissolved Solids (mg/l)	Zeolite Softening, ¢/3785 l (¢/1000 gal)	Sodium-Hydrogen Dealkalizer, ¢/3785 l (¢/1000 gal)
200	5.7	6.4
500	10.8	9.5
750	15.0	12.2

While these values are only approximations, they do show that zeolite "softening" or ion exchange with sodium chloride or sodium chloride plus sulfuric acid is fairly low in cost even at the 750 mg/l total dissolved solids level. Ion exchange does not remove dissolved solids from waste water. Therefore, ion exchange units produce regenerant wastes which require disposal. With these considerations, ion exchange units are generally used only for certain specific harmful ion situations.

Demineralization Costs

The cost of demineralization equipment itself is fairly consistent for the low solids fixed bed units used for most applications. For the specialty systems described in Section VII, particularly at solids concentrations above 1000 mg/l, the costs are significantly higher for a given capacity. Both the special nature of these units and the influence of the higher resin volumes required to take the increased loading increase capital costs. Installed capital costs can also differ greatly depending on land availability, pretreatment facilities needed, buildings, storage tanks, and engineering and contractor costs. The installed capital costs developed in this section have been adjusted using 33 percent of equipment costs for installation and six percent increase per year in equipment costs. All values are in 1973 dollars. They do not include resin costs which are covered in operating costs. Values for capital costs were taken from literature references. Average values are plotted in Figure 70.

Generally, installed capital costs for conventional demineralization units are about one-half the cost for reverse osmosis installations with similar capacities.

The operating costs for demineralizations are made up of the costs of: (1) Resin; (2) Chemicals; (3) Labor and Maintenance.

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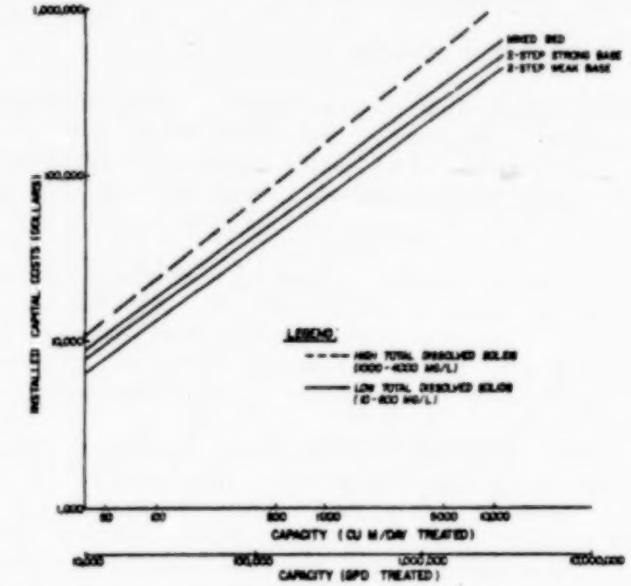

FIGURE 70
INSTALLED CAPITAL COST vs. CAPACITY FOR DEMINERALIZATION

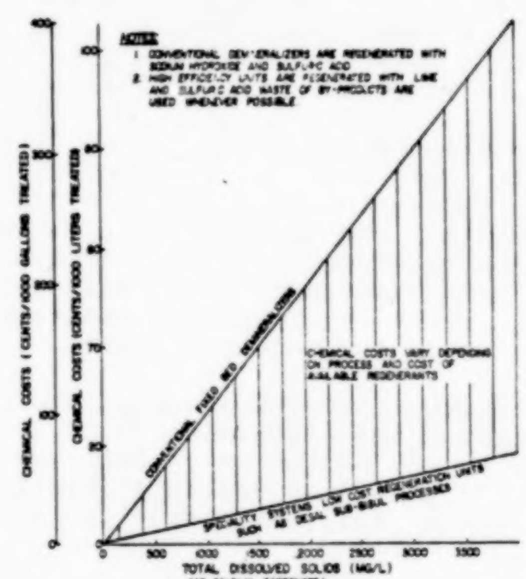

FIGURE 71
CHEMICAL COSTS FOR DEMINERALIZATION

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For the higher dissolved solids levels, chemical costs are the primary expense. These costs are shown in Figure 71. Overall costs are given in Tables 72 and 73.

Reverse Osmosis Treatment Costs

The costs involved with waste treatment using reverse osmosis are given comprehensive coverage in reference (49). The costs for reverse osmosis treatment include capital equipment, membrane replacement, pretreatment, power and labor plus maintenance materials.

The capital costs for reverse osmosis installations vary with plant size. Small units cost \$1.00 to \$1.50 per 3.78 l/day (gal/day) while large units lower this cost to \$0.50 or less per 3.78 l/day as shown in Figures 72 and 73. These costs do not include either extensive pretreatment or disposal facilities.

The selection of the membrane material, either sheet or hollow fiber, is governed by the nature of the waste to be treated and the product water quality desired. In general, tighter (small pore size) membranes have lower flux rates than more open structured ones. Therefore, to obtain low total dissolved solids product water, the area required for treatment will be significantly higher than for an allowable high total dissolved solids product water. In turn, the increased membrane surface area will increase the capital and membrane replacement costs. This correlation is shown in Figure 74.

Membrane life is one of the major factors of operating costs. Currently membrane life appears to be one to three years, with the average shifted toward the one to two year interval for replacement. This short and variable life has restricted use of reverse osmosis in many otherwise logical applications.

Since modules constitute one-third to one-half of the capital equipment costs, the life of the modules is critical. Unfortunately, module performance and life are difficult features to predict and control. For this reason, cost developments in this section are based on a two year life. As application experience increases, improved membrane life will significantly reduce operating costs. Table 74 summarizes membrane replacement costs for a membrane life of two to three years.

Various chemical pretreatments are required to prepare feedwater for passage through the membrane units. Included in these pretreatments are pH adjustment, such as acid addition to eliminate carbonate scaling, sulfate scaling control through addition of sodium hexametaphosphate, and chlorination for organics.

TABLE 72. Overall Costs for Demineralization

FIXED BED 2-STEP DEMINERALIZATION

Capacity Treated cu m/day(GPD)	Installed Capital Amortization ¢/1000 gallons or 3785 liters	Resin Costs ¢/1000 gallons or 3785 liters	Chemical Costs ¢/1000 gallons or 3785 liters	Labor and Maintenance Costs ¢/1000 gallons or 3785 liters	Overall Costs ¢/1000 gallons or 3785 liters
		100 mg/liter, Total Dissolved Solids			
38(10,000)	26.3	3.2	10	1.8	41.3
378(100,000)	16.3	3.2	10	1.1	30.6
3785(1,000,000)	8.2	3.2	10	0.5	21.9
		500 mg/liter, Total Dissolved Solids			
38(10,000)	26.3	3.2	50	1.8	81.3
378(100,000)	16.3	3.2	50	1.1	70.6
3785(1,000,000)	8.2	3.2	50	0.5	61.9
		1000 mg/liter, Total Dissolved Solids			
38(10,000)	26.3	3.2	100	1.8	131.3
378(100,000)	16.3	3.2	100	1.1	120.6
3785(1,000,000)	8.2	3.2	100	0.5	111.9
		2000 mg/liter, Total Dissolved Solids			
38(10,000)	26.3	6.4*	200	1.8	234.5
378(100,000)	16.3	6.4*	200	1.1	223.8
3785(1,000,000)	8.2	6.4*	200	0.5	215.1

*Double resin cost assumed for increased loading.

TABLE 73. Overall Costs for Demineralization

SPECIALTY PROCESSES -- High Efficiency-Low Cost Regeneration Units

Capacity Treated cu m/day(GPD)	Capital Amortization ¢/1000 gallons or 3785 liters	Resin Costs ¢/1000 gallons or 3785 liters	Chemical Costs ¢/1000 gallons or 3785 liters	Labor Maintenance Costs ¢/1000 gallons or 3785 liters	Overall Costs ¢/1000 gallons or 3785 liters
		1000 mg/l, Total Dissolved Solids			
38(10,000)	43	3.2	17	2.9	66.1
379(100,000)	21.4	3.2	17	1.4	43.0
3785(1,000,000)	12.5	3.2	17	0.8	33.5
		2000 mg/l, Total Dissolved Solids			
38(10,000)	43	6.4*	33	2.9	85.3
379(100,000)	21.4	6.4*	33	1.4	62.2
3785(1,000,000)	12.5	6.4*	33	0.8	52.7
		3500 mg/l, Total Dissolved Solids			
38(10,000)	43	12.8**	60	2.9	118.7
379(100,000)	21.4	12.8**	60	1.4	95.6
3785(1,000,000)	12.5	12.8**	60	0.8	86.1

*Double resin cost assumed for increased loading.
**Four times low solids resin costs assumed for this very heavy loading.

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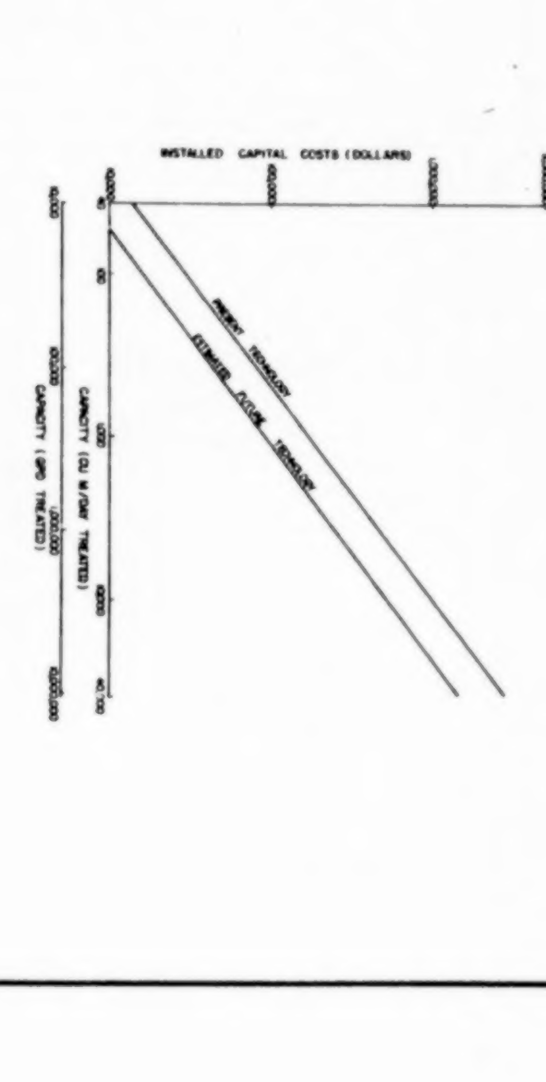

FIGURE 72
INSTALLED CAPITAL COSTS FOR REVERSE OSMOSIS EQUIPMENT

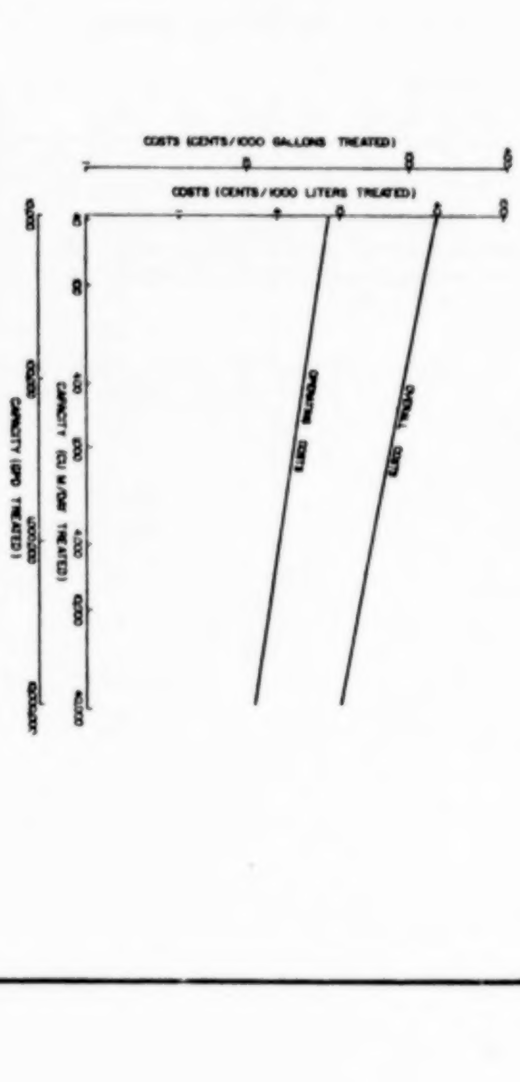

FIGURE 73
COSTS FOR REVERSE OSMOSIS TREATMENT

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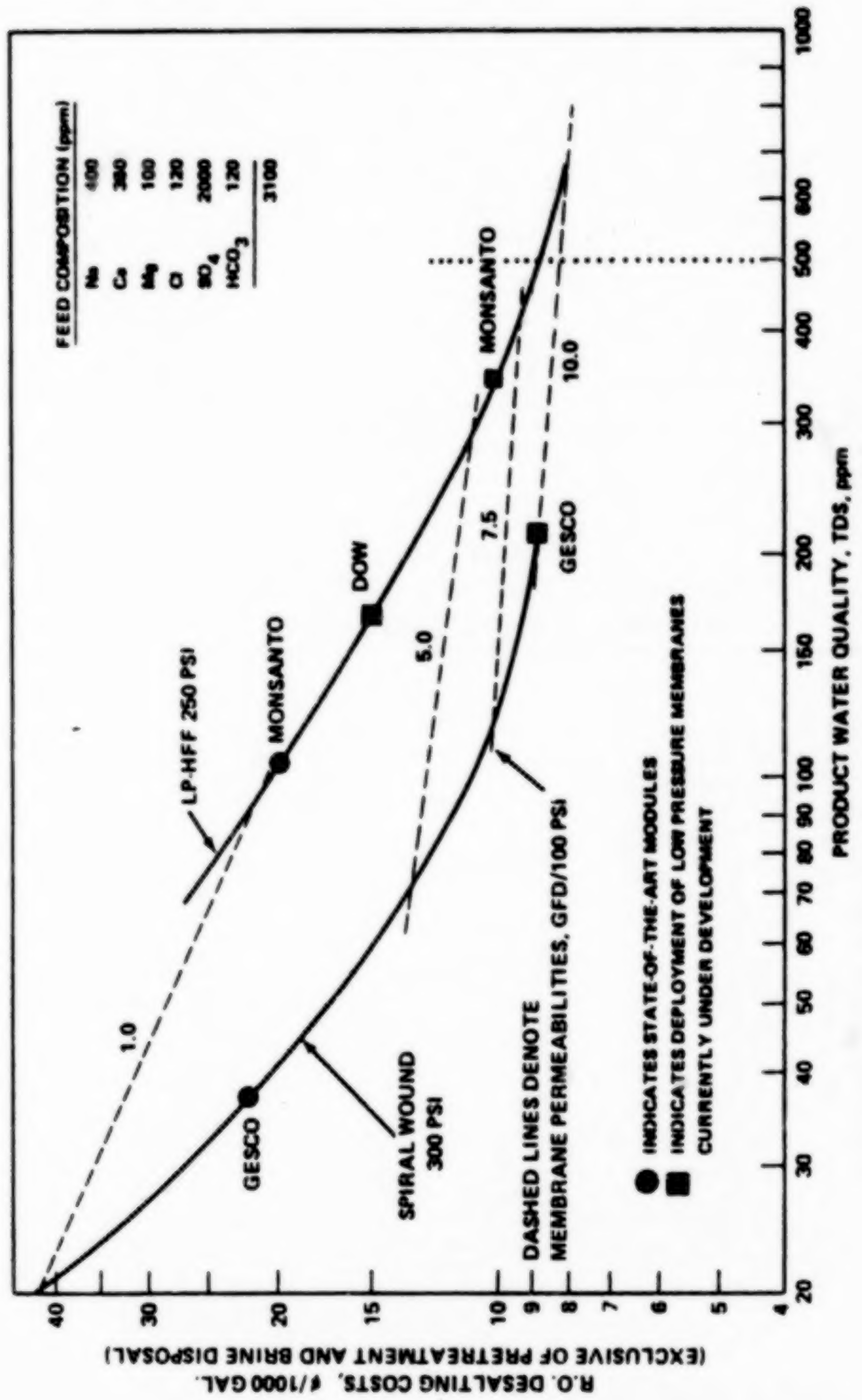

FIGURE 74. TRADE-OFF BETWEEN MEMBRANE PERMEABILITY (FLUX) AND SELECTIVITY (REJECTION AND PRODUCT WATER QUALITY) FOR CELLULOSE ACETATE BASE MEMBRANES (10 MGD PLANT @ 55% RECOVERY, 3100 ppm TDS FEED)

TABLE 74. Reverse Osmosis -- Membrane Replacement Costs

Volume Treated		¢/1000 gal. or 3785 l Treated			
		2 Yr. Life		3 Yr. Life	
cu m/day	GPD	Present	Future	Present	Future
38	10,000	45	22	30	15
95	25,000	45	22	30	15
189	50,000	45	22	30	15
379	100,000	38	20	25	13
945	250,000	38	20	25	13
1,890	500,000	30	15	20	10
3,785	1,000,000	30	15	20	10
18,900	5,000,000	22	12	15	8
37,850	10,000,000	15	8	10	5

Taken from Reference (49), p. 108. Converted to cu m/day and GPD treated basis plus two (2) year life adjustment.

TABLE 75. Reverse Osmosis -- Operating Costs

Volume Treated		¢/1000 gal. or 3785 l Treated			
cu m/day	GPD	Power*	Chemicals**	Labor Plus Maintenance Materials	Total Cost
38	10,000	6	4	28	38
95	25,000	6	4	20	30
189	50,000	6	4	15	25
379	100,000	6	4	10	20
945	250,000	6	4	7	17
1,890	500,000	6	4	5	15
3,785	1,000,000	6	4	4	14
18,900	5,000,000	6	4	2	12
37,850	10,000,000	6	4	15	11.5

*At 1¢ per kwhr.
**Will vary depending on pretreatment required.
***Additional breakdowns in reference cited above.

A low energy requirement is one of the major advantages of the reverse osmosis process. The primary energy requirement is for high pressure pumps.

The operating costs are summarized in Table 75. Figure 73 combines the information developed into overall reverse osmosis treatment costs. These values are based on conservative engineering and industrial calculations and assumptions, assuming straight line ten year depreciation, six percent money and membrane life of two years.

Evaporation Costs

Although there are many different designs and variations of evaporative equipment, four basic types, as described in Section VII, are commonly employed in the inorganic chemicals manufacturing industry. They are: (1) single-effect evaporators; (2) multi-effect evaporators; (3) high efficiency vertical tube and multi-effect flash evaporators; and (4) low energy specialty evaporators. Costs for these types of equipment and their operation are given in the following subsections.

Each type of evaporator has its individual operating specifications, as shown in Table 76. Figure 75 compares the energy requirements of each evaporator type with other treatment techniques as a function of dissolved solids concentration.

The selection of evaporative equipment depends on the job requirements. For high volume, low solids stream concentrations the VTE, or multi-flash type units should be used. Ninety percent or more of the water can be recovered as high purity product with relatively low energy requirements. The remaining five to ten percent can be more economically removed by recirculating evaporators or dryers. Although energy requirements are high per kg of water removed for single effect evaporators and dryers, the total energy requirement and capital costs for this step are relatively low. High volume, high solids content streams may be handled similarly except that conventional multi-effect evaporators should be used for the first concentration.

Low Energy Specialty Evaporator Costs

Capital costs for a low energy specialty unit, the flat plate vapor compression evaporator, are given below.

Capacity cu m/day (gal/day)	Installed Capital Costs, $
379 (100,000)	635,000
850 (225,000)	1,350,000
1890 (500,000)	2,500,000

TABLE 76. Evaporator Characteristics

Characteristics	Re-circulative Evaporator	Multi-effect	High Efficiency Vertical Tube Evaporator	Low Energy Specialty Evaporator
Effects	1-3	2-6	10-20	15-30
Evaporative energy, kg cal/kg (Btu/lb)	222-555 (400-1000)	100-333 (180-600)	42-56 (75-100)	19-56 (35-100)
Optimun concentration range, % by weight of solids	20 to max.	10-50	1-10	1-10
Ability to handle heavy crystallizing or suspended solids load	Excellent	Good, can be easily equipped for re-circulation	Poor, not operable	Good, for calcium sulfate and other slurries
Optimum capacity range	Best for small capacity below 5000 GPD	Good over wide capacity range 10,000-2,000,000 GPD	Mainly for high capacity more than 1,000,000 GPD	Mainly for high capacity more than 100,000 GPD
General costs	Relatively low	Intermediate	High	Highest

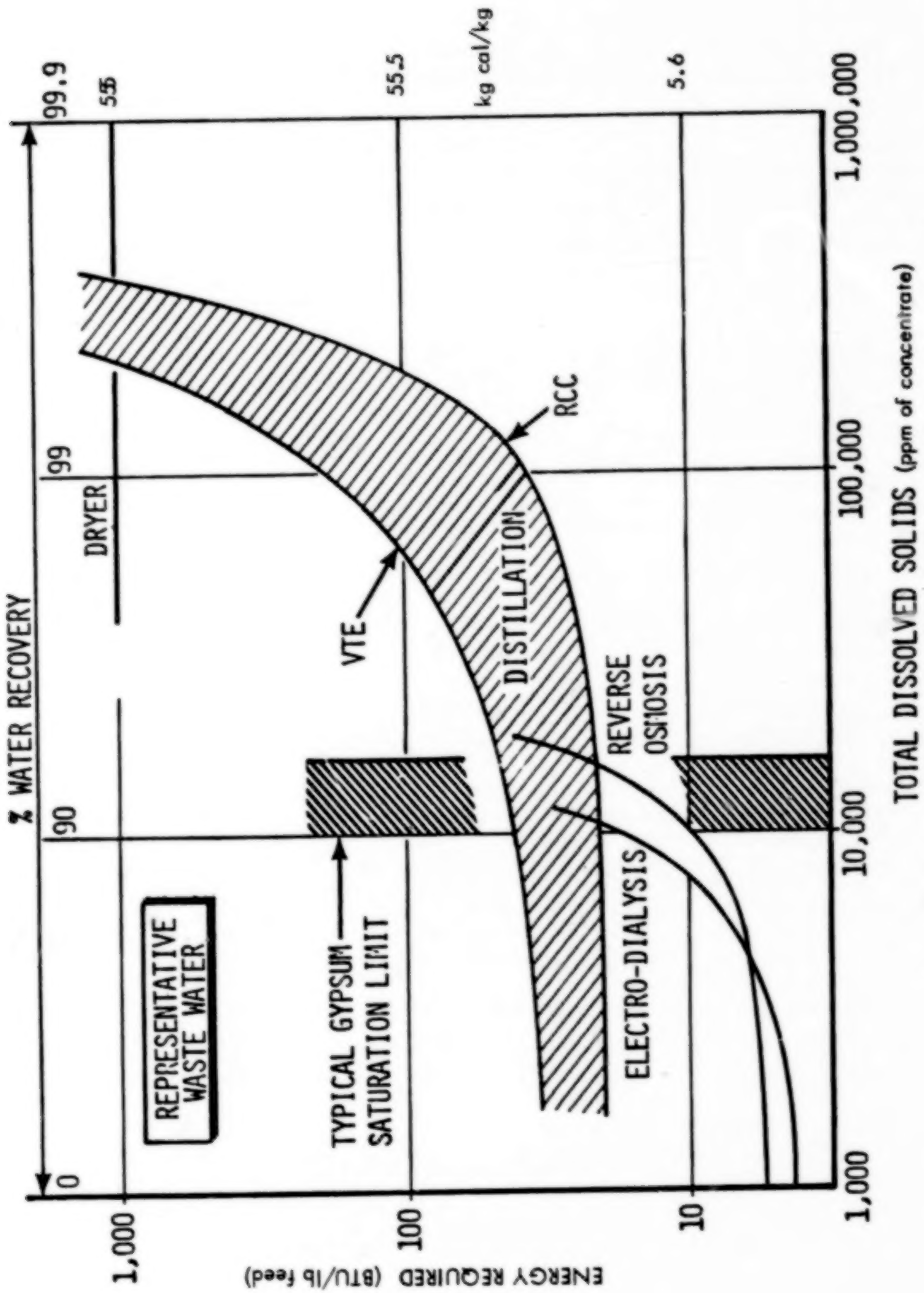

FIGURE 75. ENERGY COMPARISON FOR DISSOLVED SOLIDS REMOVAL

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Larger capacities are made up of multiple small units. Operating expenses include costs for electric power, pretreatment chemicals, and labor.

Unlike most evaporators, this unit uses an electrically driven compressor instead of steam for its energy. Therefore, operating cost is directly influenced by the electrical power costs in the area. This cost may range from $0.003/kwhr to over $0.01/kwhr. For industrial applications, operating power costs are taken as $0.01/kwhr. The amount of power required depends on the specific operating conditions. The following table gives estimated power as a function of the concentration of total dissolved solids in the concentrate.

Concentrate TDS* (mg/l)	kwhr/1,000 gal or 3785 l Treated
10,000	60
50,000	65
100,000	100
200,000	250

*Total solids, including those suspended in the slurry, may be several times greater than the dissolved solids.

Operating and overall costs in ¢/3785 liters (1000 gallons) for an 850 cu m/day (225,000 gpd) unit are given below:

Concentrate TDS*, mg/l	Power ¢/3785 l (¢/1000 gal)	Chemicals ¢/3785 l (¢/1000 gal)	Operation and Maintenance ¢/3785 l (¢/1000 gal)	Total ¢/3785 l (¢/1000 gal)
10,000	60	3	52	115
50,000	65	3	52	120
100,000	100	3	52	155
200,000	250	3	52	305

*Since sparingly soluble water contaminants such as calcium sulfate and silica precipitate with concentration, total solids are usually much higher.

Concentrate TDS mg/l	Capital ¢/1,000 gal or 3785 l	Operation ¢/1,000 gal or 3785 l	Total ¢/1,000 gal or 3785 l
10,000	257	115	327
50,000	257	120	377
100,000	257	155	412
200,000	257	305	562

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These overall cost values are consistent with the basis used for other calculations of this report -- industrial 10 year depreciations and higher cost electric power than would be available to many current users. Low cost power and 35 year capital writeoffs would bring the overall costs down to approximately $2.00/1,000 gallons or 3785 l treated.

It should also be emphasized that the power requirement correlation with total dissolved solids neglects the suspended solids portion of the recirculated slurry. Since many dissolved solids such as calcium sulfate are only sparingly soluble in water, concentration causes them to precipitate and form slurries. The unit is designed to handle such slurries up to total solids contents of 35 to 50 percent (at which point the total dissolved solids might be one percent or 10,000 mg/l). The critical difference here is that dissolved solids raise the boiling point of the solution, whereas suspended solids do not. The ability to handle slurries is one of the key technology advantages over multi-flash and vertical tube evaporators which are discussed next.

Vertical tube, multi-stage flash, and other high efficiency evaporators have been used in units to recover pure water from salt or brackish sources. Installed capital costs are shown in Figure 76 and operating and overall costs are given in Figure 77.

Conventional Multi-Effect Evaporators

For the heavy-duty, very high solids evaporations, industrial type multi-effect evaporators are commonly used. The inorganic salts in sea water and inorganic chemical industry are very corrosive. Even cupro-nickel and stainless steel alloys may not be sufficient for many of the solutions involved. Therefore, for this section, costs are given for solid nickel, titanium and tantalum materials, as well as stainless steel. Nickel construction raises the cost significantly, but will provide the reliable service required for industrial applications.

In selecting the optimum number of effects, a balance has to be made between equipment costs and operating costs. If the addition of an effect will not pay for itself in lower steam costs within approximately three years, the effect will probably not be added. It is rare that more than six or seven effects can be justified in this manner. (This is particularly true because of the high dissolved solid solutions or waste involved). Figures 78 and 79 show the interrelationships between number of effects and capital cost and steam usage, respectively.

Capital costs may be calculated rather quickly and directly from Figure 80:

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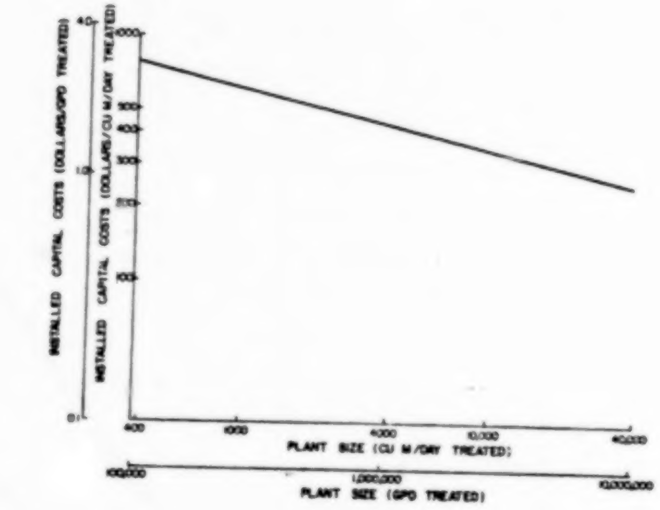

FIGURE 76
INSTALLED CAPITAL COSTS vs. CAPACITY FOR HIGH EFFICIENCY VTE OR MULTI-STAGE FLASH EVAPORATORS

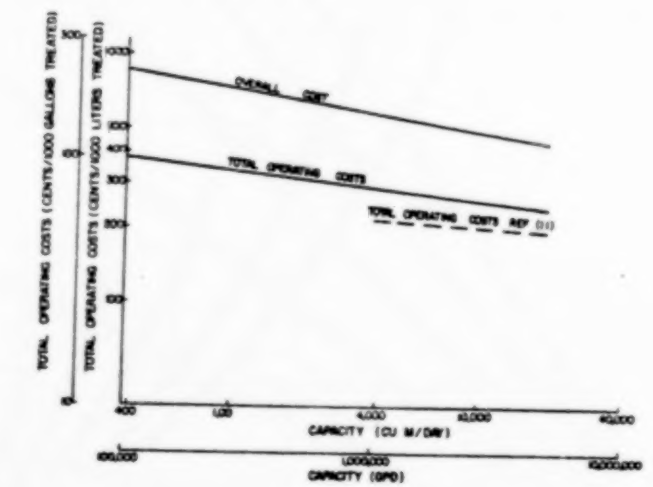

FIGURE 77
OVERALL AND TOTAL OPERATING COSTS FOR VTE AND MULTI-FLASH EVAPORATORS

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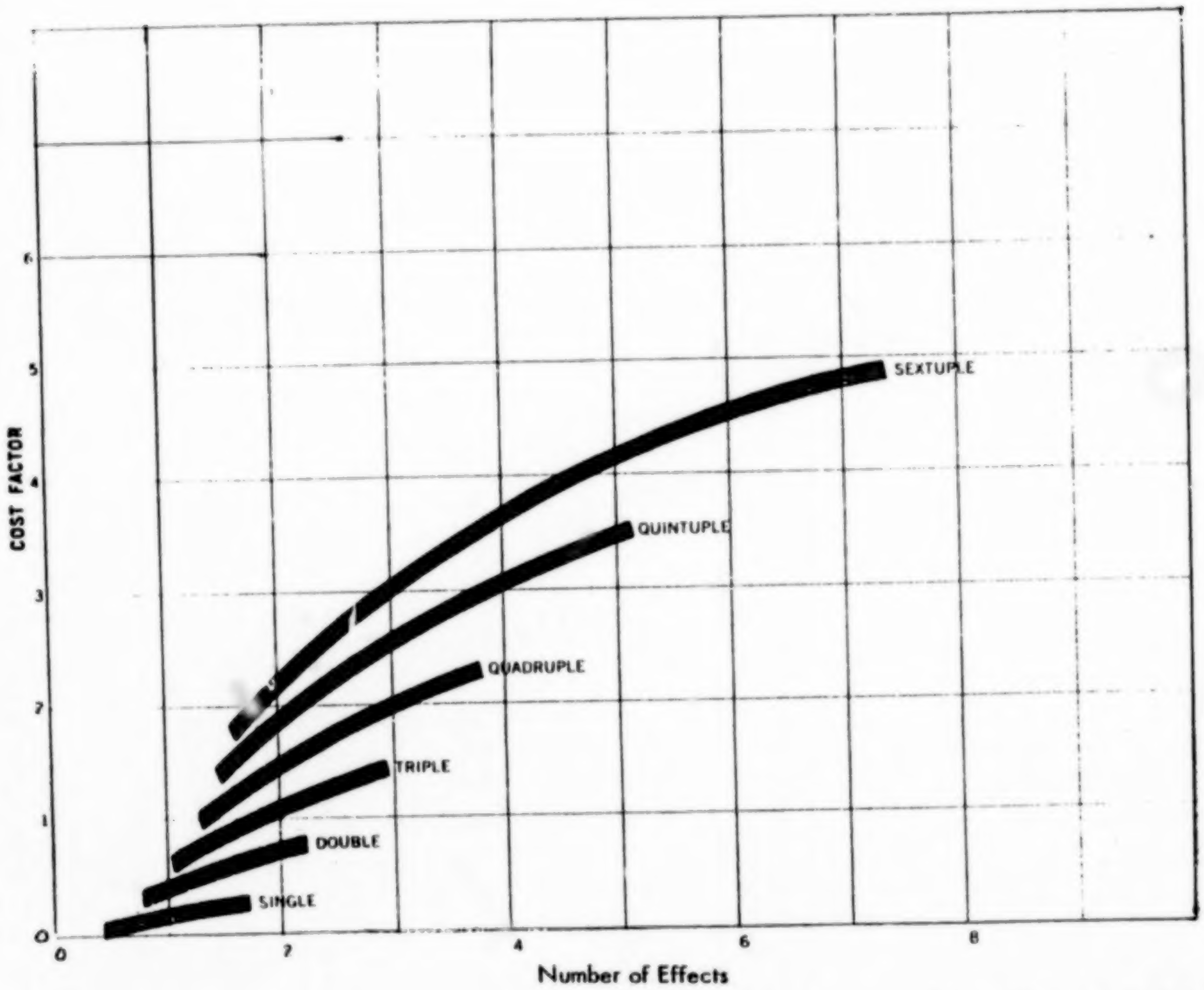

EVAPORATION

Figure 78. Capital Costs Vs. Effects for Conventional Multi-Effect Evaporators.

EVAPORATION

Figure 79. Steam Usage Vs. Effects for Conventional Multi-Effect Evaporators

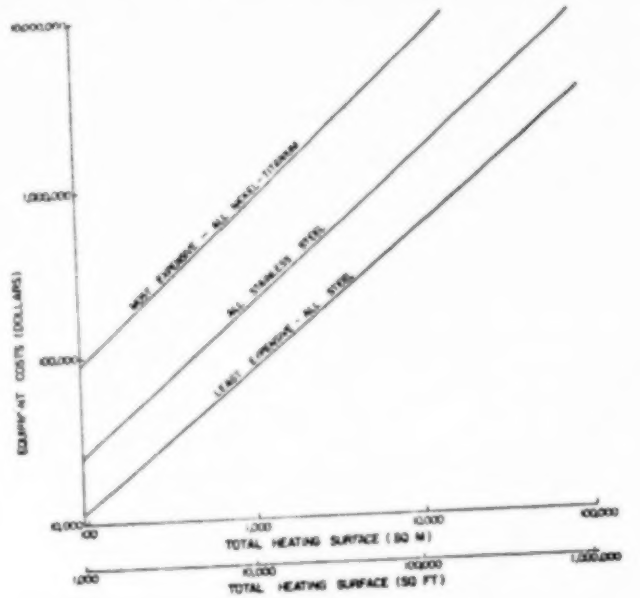

FIGURE 80
CORRELATIONS OF EQUIPMENT COST WITH EVAPORATOR HEATING SURFACE

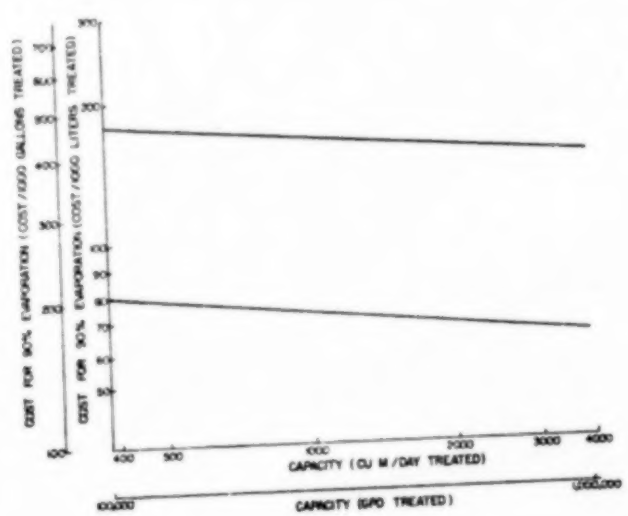

FIGURE 81
OVERALL COSTS FOR 6-EFFECT EVAPORATOR TREATMENT OF WASTE WATER

Volume Treated cu m/day (gal/day)	Total Installed Capital Cost, $
378 (100,000)	667,000
945 (250,000)	1,530,000
1890 (500,000)	2,800,000
3785 (1,000,000)	5,470,000

Analogous values for stainless steel and other construction material capital costs may be similarly derived.

Operating costs include steam costs and labor and maintenance. Chemical pretreatment costs are usually minimal. Operating costs are summarized below for six-effect evaporators.

Overall costs for all-nickel and stainless steel six-effect evaporators are given in Figure 81.

Volume Treated cu m/day	Volume Treated gal/day	Steam Costs in ¢/3785 l (¢/1000 gal)	Labor and Maintenance ¢/3785 l (¢/1000 gal)	Total Costs ¢/3785 l (¢/1000 gal)
378	100,000	95	91	186
945	250,000	95	80	175
1890	500,000	95	71	166
3785	1,000,000	95	68	163

Single-Effect Evaporators

When evaporation loads are small or for final concentrations or minor waste streams, evaporative energy costs are secondary. In these cases, equipment costs and reliability of operation are the controlling considerations. Various designs are available for handling crystallizing solids or slurries and design and industrial technology is widely available.

Using Figure 80 and following the same procedures and costs for energy, installation, maintenance and labor as for multieffect evaporators, costs can be developed. Essentially, costs for single-effect evaporators are treated as an extrapolation of the multi-effect cost values. A summary of the costs involved is shown below for single-effect evaporators assuming stainless steel construction.

Treated cu m/day	Treated gal/day	Installed Capital Costs, $	Capital Writeoff ¢/3785 l (¢/1000 gal)	Operating Costs ¢/3785 l (¢/1000 gal)	Overall Costs ¢/3785 l (¢/1000 gal)
38	10,000	8,000	34	564	598

189	50,000	28,000	24	551	575
379	100,000	45,000	19	545	564
945	250,000	80,000	14	539	553
1890	500,000	146,000	12	536	548
3785	1,000,000	267,000	11	533	544

Basis:

Treated cu m/day	Treated gal/day	Installation Costs Percent of equipment capital	Labor Costs ¢/3785 l (¢/1000 gal)
38	10,000	100	30
189	50,000	100	20
379	100,000	50	17
945	250,000	33	10
1890	500,000	33	8
3785	1,000,000	33	5

15 percent Capital writeoff/yr.
4 percent Capital cost/yr for maintenance materials.
90 percent Evaporation.
Steam cost -- $0.70/1000 lbs or $0.70/454 kg.

Similar values for all nickel, titanium or tantalum construction are:

Treated Volume cu m/day	Treated Volume gal/day	Installed Capital Costs,$	Capital Writeoff ¢/3785 l (¢/1000 gal)	Total Operating Costs ¢/3785 l (¢/1000 gal)	Overall Costs ¢/3785 l (¢/1000 gal)
38	10,000	16,000	69	574	643
189	50,000	68,000	58	561	619
378	100,000	133,000	57	555	612
945	250,000	300,000	52	549	601
1890	500,000	532,000	46	545	591
3785	1,000,000	1,060,000	45	542	587

Basis: Same as previously shown except 33 percent of capital costs are used for installation estimates for all capacities.

These figures show that single-effect evaporation costs are largely for steam, with capital costs being only a small fraction of the overall cost. All nickel, titanium, tantalum or other high cost materials of construction are often needed and can be economically used.

The high overall costs per liter treated also indicate that single-stage evaporators are restricted to small capacities. For example, at the 3785 cm/day (1,000,000 gal/day) capacity, yearly overall cost for stainless steel equipment is $1,910,000. Comparable multi-effect and VTE costs are $583,000 to $1,400,000 yearly. Obviously the higher efficiency units would be used

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whenever possible. At the 379 cu m/day (100,000 gal/day) level, comparable costs are $198,000/yr for single-effect, $72,200/yr for six-effect, and $78,500/yr for 14-effect. For this case, there is still approximately $120,000/yr savings in going to multi-effect evaporators. Single-effect evaporators would normally be used in the capacity range of 48 cu m/day (10,000 gal/day).

Mechanical Drying Costs

The crystallized, suspended or dissolved solids removed in the previous evaporation section can either be recycled, sold, or disposed of in their concentrated form. In some cases, they may require further treatment. Whenever possible, suspended solids should be dewatered by centrifuging or filtration. These relatively low cost treatments may be all that is needed, or reduction to full dryness may be required. When full dryness is required, the filter cakes, centrifuged solids, and concentrated solids may be subjected to conventional thermal drying. Heating may be by gas, oil, or steam. Types of dryers include rotary drum dryers, screw type mechanical dryers, scraped surface tunnel dryers and heated evaporation pans.

Capital costs and labor costs are minimal in comparison to energy costs. Labor and materials are estimated to cost $0.11 to $0.33/kkg ($0.10 to $0.30/ton) of product for small dryers (Reference (71).

Taking energy costs as $0.50 per 252,000 kg cal (million BTU) (gas or oil combustion) and an energy utilization efficiency of 50 percent, drying costs are $1.00/454 kg (1000 lb) of water evaporated.

Drying costs as a function of solids content are given below:

Percent Solids in Feed by weight	Drying Costs, ¢/454 kg (¢/10,000 lb)	Drying Costs, ¢/3758 l (¢/1000 gal)
90	10	Dry Basis
80	20	Dry Basis
70	30	Dry Basis
60	40	Dry Basis
50	50	420
40	60	500
30	70	580
20	80	600

Aside from the energy costs involved, there are practical drying problems with common dissolved salts such as calcium chloride, potassium chloride, and magnesium chloride. These can be dried but they hold tenaciously to residual water and must be given

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special handling techniques including the use of drum flakers or pan evaporators.

Deep Welling Costs

The capital costs for injection wells vary greatly, from $40,000 to more than $1,000,000. The costs depend on factors such as well depth, geology, well hole size, care in drilling, well construction, geographical location, pretreatment requirements, instrumentation and monitoring, corrosion problems, injection pressure, and maintenance. The operating life of such wells is difficult to predict and may be very short due to blockage, contamination of water aquifiers, or other reasons.

The principal cost factors in well construction are drilling contractor costs and casing and tubing costs. These two factors comprise approximately two-thirds of the total construction costs. The larger and deeper the hole, the higher the contractor costs will be.

Surface equipment such as pumps, filters, tank, piping, and instrumentation can vary from 50 percent of construction costs to 100 percent or more. Injection pressures above 27 atmospheres (400 psi) require more expensive pumps. Corrosive liquids require more expensive materials in the liquid handling equipment.

The average deep well capital and operating costs determined from a recent comprehensive survey (Reference (77) are: capital cost -- $305,000; operating costs -- 30¢/3785 l (1000 gal).

Operating costs for deep well disposal range from 4¢/3785 l (1000 gal) to $2.20/3785 l (1000 gal). The lower costs are for shallow wells, low injection pressures, minimum pretreatment, relatively low corrosiveness, and a minimum of monitoring and instrumentation. The higher operating costs involve deep wells with high injection pressures, extensive pretreatment, high maintenance costs, extensive monitoring and instrumentation, and corrosion resistant equipment. In any cost calculations involving deep wells, as discussed in Section VII, either a backup well or alternate disposal facility is necessary. This will increase the average capital cost to approximately $500,000 (for a single-well operation).

Calculating overall costs for deep well disposal at a 1890 cu m/day (500,000 gal/day) rate and using a 15 percent capital amortization yields an overall cost of 73¢/3785 l (1000 gal).

Solids Wastes Disposal Costs

The slurries, water soluble solids and water insoluble solids obtained from control and treatment of inorganic chemicals in-

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dustry water-borne wastes have to be contained, or disposed of, in a safe and economical manner.

Provided that the solids are insoluble in water, most solid wastes from the inorganic chemicals industry may be land dumped or land-filled. Costs are $0.22 to $0.66/kkg ($0.20 to $0.60/ton) of solids -- for simple dumping or landfilling. Figure 82 gives a breakdown of complete landfilling costs. Large scale operations without cover cost less than $1.11/kkg ($1.00/ton). If cover is involved for appearance or zoning requirements, the costs may increase to $1.05 to $2.20/kkg ($1.50 to $2.00/ton).

If the evaporation-rainfall situation for the disposal area is favorable (as is the case for much of the southwestern U.S. and some other areas of the country), then landfill in an impervious, lined pan is feasible for soluble solids. Operation costs are similar to those for landfill with no cover, $0.22 to $0.66/kkg ($0.20 to $0.60/ton).

Landfilling of containerized soluble solids in plastic drums or sealed envelopes is practicable but expensive. Blow-molded plastic drums, made from scrap plastic (which is one of the present major problems in solid waste disposal) could be produced for $11-22/kkg ($10-20/ton) capacity at 227 kg (500 lb) solids per drum and a rough estimate of $2.50-5.00 cost/drum. A more economical method, particularly for large volumes, would be sealed plastic envelopes, 750 microns (30 mils) thick.

At $1.10/kg ($.50/lb) of film, low density polyethylene costs about 10¢ per 0.0929 sq m (1 sq ft). Using the film as trench liner in a 1.8 m (6 ft) deep trench 1.8 m (6/ft) wide, the perimeter (allowing for overlap) would be approximately 7.5 meters (25 feet). At a density of 1.6 gm/cc (100 lb/cu ft) for the solid, costs of plastic sheet/kkg would be $2.00 ($1.75/ton). With sealing, the plastic envelope cost would be approximately $2.20/kkg ($2/ton). With landfill costs of $2.20/kkg ($2/ton) additional, the total landfill disposal costs would be about $4.40/kkg ($4/ton).

The above figures for soluble disposal using plastic containers, bags or envelopes are only rough estimates. Also, the technology would not be suitable for harmful solids or in situations where leaching contamination is critical.

Treatment Costs for Ancillary Water-Borne Wastes

In many plants of this study ancillary wastes such as boiler blowdowns, cooling tower blowdowns, ion exchange regenerants, and contributions from air purification equipment, are either the sole or dominant contributors to water-borne wastes coming from the plant. Rarely is removing these wastes from plant effluent

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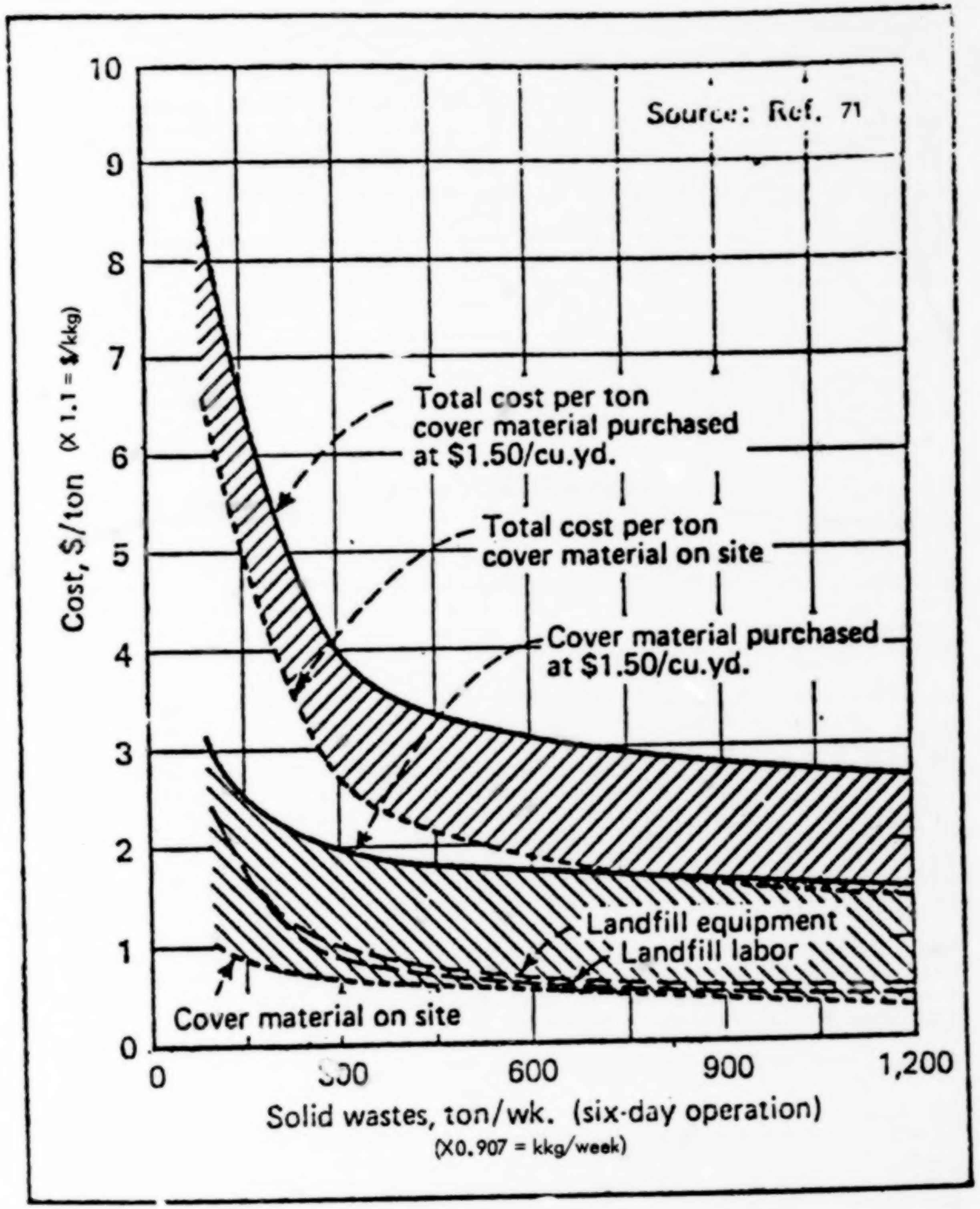

Figure 82. Disposal Costs for Sanitary Landfills

water considered part of the treatment of waste abatement process costs.

Air-Borne Waste Abatement Costs

Five chemicals of this study have been selected for specific cost analysis. They are described below.

Sulfuric Acid

Reduction of sulfur dioxide in the stack gas of sulfuric acid plants to specified limits is expensive for most existing plants. In each of two plants of this study (113 and 023), over $2,500,000 has been spent for this purpose alone. As regulations tighten, other plants will have to be modified similarly. The nature of these modifications should be determined by the overall costs and performance of the sulfur dioxide unit considered.

If a sulfuric acid producer does not choose to follow the path of scrubbing sulfur dioxide from the stack gases, it will undoubtedly be more profitable to recycle sulfur dioxide which should have a recovered sales value of approximately $50/kkg ($45/ton) and eliminate the expense of sodium hydroxide or other chemicals.

Both add-on double adsorption systems and other processes which have no water-borne wastes exist. New plants all use the double adsorption processes.

Calcium Oxide and Calcium Hydroxide

The manufacturing process for calcium oxide and calcium hydroxide has no waste water. The only contribution is from stack scrubbers which collect the lime dust in water.

Current practice is to settle out solids from the scrubber water in ponds and possibly neutralize this effluent before discharge to surface water. Plant 057 currently follows this general type of procedure and plans to install a cyclone recovery and calcining unit on the waste stream at a cost of $750,000. Cost of installation will be covered by product value obtained. This will remove almost 100 percent of the suspended solids. Some dissolved solids remain. Calcium oxide is soluble to the extent of about 1000 mg/l. The water may be recycled for closed loop scrubbing.

A second approach, which escapes water-borne waste and waste recovery problems, is dry bag collection. The exemplary plant of this study has no water effluent and uses dry bag collection systems. Installation cost was $675,000 with annual operating costs of $37,500.

Calcium Carbide

There is no water-borne process waste from the calcium carbide manufacturing process. The only contributions are ancillary wastes -- cooling tower blowdowns, ion exchange regenerants and gas stream scrubbings.

For water scrubbers, the water effluent may be isolated, suspended solids removed by ponding or chemical treatment, alkalinity neutralized and a closed loop recycle instituted to avoid dissolved solids discharge. Capital costs for a large plant adjusted to 1973 prices are approximately $750,000 for the scrubber system, $112,000 for improvements, plus a thickener and settling ponds that will bring the total cost up to $1,000,000. Recycle is possible but would require equipment modification. Therefore, over $1,000,000 investment is needed to water-scrub without waterborne waste with both capital and operating costs being losses.

In contrast, one plant of this study uses dry bag collection techniques throughout. Collection and reuse of 10 percent of the raw materials from these dust collectors makes installation profitable, and there are no water-borne wastes involved.

Chlorine

In contrast to the dusts from the first three processes discussed, chlorine is a reactive and noxious gas. It is soluble in water and forms hypochlorites with water or basic materials present such as sodium hydroxide or calcium hydroxide.

The hypochlorites are bleaches and may be sold. They are also reactive and can be used in the treatment of other chemical wastes such as cyanides. This is done in plant 096. Sodium hypochlorite may also be catalytically decomposed and reused. Discharge must be avoided to attain the effluent reduction possible through the application of the best available technology economically achievable. Removal later from the waste stream will be expensive.

Another method for direct utilization of tail gas chlorine is direct burning with hydrogen to produce hydrochloric acid. Plant 057 is planning this approach at an estimated capital investment of $430,000. Return on investment looks good from the standpoint of product value and decreased sodium hydroxide usage.

Aluminum Chloride

The aluminum chloride process has no water-borne wastes, but condenser gas scrubbing removes residual chlorine gas and entrained aluminum chloride fumes. Two exemplary plants (152 and 125) of this study avoid any water-borne wastes as discussed in

Section VII. Costs for a generalized treatment process are shown below to illustrate the dollar values involved. For a discharge of 4.5 kg (10 pounds) of aluminum chloride and 2.25 kg (5 lb) of chlorine per 0.907 kkg (ton) of product in a 18 kkg/day (20 ton/day) plant, treatment costs are developed below for neutralization with sodium hydroxide. Sodium hydroxide costs are estimated to be $70,000/yr. Also, 195 kg/day (430 lb) of sodium chloride and 53 kg/day (117 lb) of aluminum hydroxide are formed. The volume of neutralized solution is approximately 946l/ day (250 gal/day). Installed cost for a 379/l (1000 gal) neutralizing, settling and hypochlorite decomposition system plus a small recirculating single-effect concentrator and crystallization system would be approximately $25,000. Operating costs including steam, electricity, disposal of solid wastes, labor and maintenance, and chemical costs would be approximately $12,000/yr. Overall costs of capital writeoff plus operating costs would be approximately $16,000/yr or slightly more than $2.20/kkg ($2/ton) of product.

Boiler Blowdowns, Cooling Tower Blowdowns, and Ion-Exchange Regenerants Treatment Systems and Their Costs

Present water treatment facilities in existing plants are usually not designed for zero discharge of water-borne wastes, nor are they designed for complete closed cycle operation. The generalized water treatment facilities given in Figure 63 earlier in this section provide three treatment techniques for removing dissolved solids from makeup and recycle water-demineralization, reverse osmosis and evaporation. It is assumed from the overall treatment model given in Figure 62 (of which Figure 63 is a detailed portion) that suspended solids and toxic materials have already been removed. Figure 83 gives the dissolved solids concentration range over which each type of treatment technique is economically feasible. Costs for different flow rates and dissolved solids contents are given in Table 77. This table shows that if all the incoming and recycle water and blowdowns are less than 1000 mg/l total dissolved solids then demineralizations can be used economically from 1000 mg/l to 3500 mg/l. Specialty demineralization systems are favorable, if available. Most blowdowns are in the 750 mg/l to 3500 mg/l range. Regenerants disposal adds to the overall demineralization costs. With these costs added, the specialty demineralization and reverse osmosis plus evaporation treatment costs are nearly equal in the 1000 mg/l to 3500 mg/l range. If any of the streams coming into the treatment area have greater than 3500 mg/l total dissolved solids, then reverse osmosis and/or evaporation are usually the only treatment approaches.

A model plant example is shown in Table 78 to illustrate needed equipment and costs for treatment.

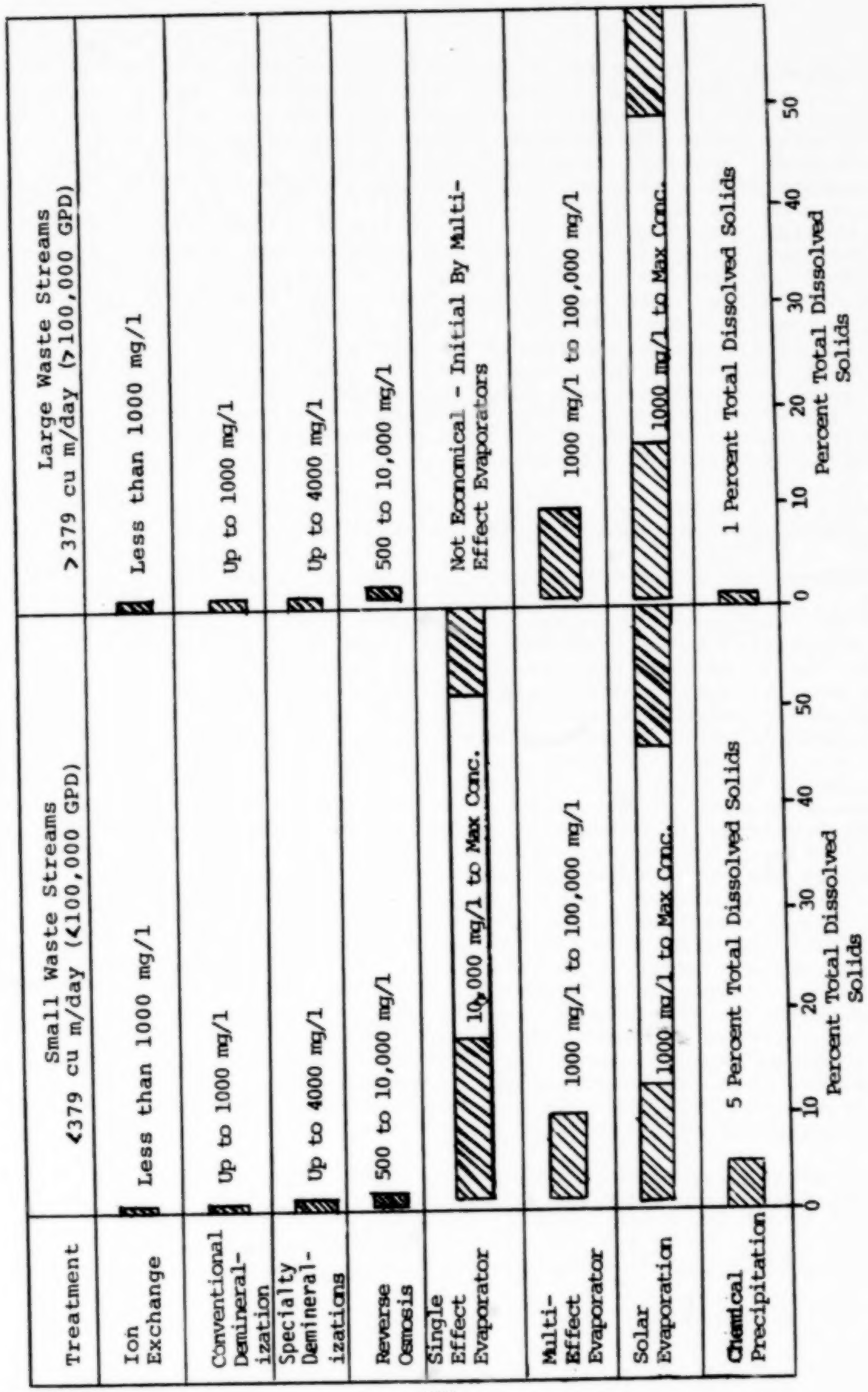

Figure 83. Treatment Applicability to Dissolved Solids Range in Waste Streams.

TABLE 77 Cost Estimates for Different Treatment

Flow cu m/d (GPD)	Demineralization Costs, $/day		Reverse Osmosis + Evaporation Costs, $/day
100 mg/liter Total Dissolved Solids			
	Conventional Fixed-Bed		
38(10,000)	4		20
379(100,000)	31		142
3785(1,000,000)	220		1005
37850(10,000,000)	2000		6000
1000 mg/liter Total Dissolved Solids			
	Conventional Fixed-Bed	Specialty Systems	
38(10,000)	13	7	20
379(100,000)	121	43	142
3785(1,000,000)	1120	335	1013
37850(10,000,000)	10,000	~3000	6275
3500 mg/liter Total Dissolved Solids			
	Specialty Systems		
38(10,000)	12		20
379(100,000)	96		142
3785(1,000,000)	861		1013
37850(10.000,000)	8000		6275
10,000 mg/liter Total Dissolved Solids			
38(10,000)	Costs are very high. This is above the application level.		20
379(100,000)			154
3785(1,000,000)			1115
37850(10,000,000)			7600

TABLE 78. Model Treatment Plant Calculations
Design and Cost Basis

Waste Category	cu m/d (GPD)	Total Dissolved Solids, mg/l	
Process Water	379(100,000)	10,000	
Cooling Tower Blowdown	38(10,000)	1,000	
Boiler Blowdowns	19(5,000)	500	
Air Pollution Control	38(10,000)	10,000	(Recoverable at $33/kkg or $30/ton.)
Makeup Water	189(50,000)	300	

Equipment Needed	cu m/d (GPD)	Capital Cost, $	
Demineralizer	379(100,000)	60,000	
Reverse Osmosis Unit	379(100,000)	80,000	
Multi-Effect Evaporator	94(25,000)	60,000	
2-Single-Effect Evaporators	38(10,000)	32,000	
Rotary DrumFilter	--	25,000	
Centrifuge	--	25,000	Total $282,000

Waste Treated	Overall Costs/Day
Process Water	$ 142
Cooling Tower Blowdown	$ 45
Boiler Blowdown	$ 45
Make-Up Water	$ 45
Air Pollution Control	($ 100 credit)
Net Cost	$ 85 or $30,000/yr.

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In addition to the cost of treating the waste streams, approximately 36-45 kkg (40-50 ton) per day of solids must be disposed of. Disposal costs for these could range from $1.10 to $11.00 /kkg ($1 to $10/ton). A centralized treatment system as described gives not only zero water-borne waste but also supplies all the demineralized water needed for boilers, operation of cooling water towers at 95 to 98 percent recycle, and reduces process water wastes. Since the treatment equipment is all highly automated, labor costs are also low.

Geographic Influences on Treatment and Control Costs

Treatment and control practices and costs for the inorganic chemicals industry depend largely on plant location.

Ocean dumping may be economically feasible only for plants with easy access to the ocean. Even a difference of being located directly on ocean shores as contrasted to being 80 to 160 km (50 to 100 miles) up a bay or river can change barging costs by a factor of two. Ocean barging for titanium dioxide wastes may be as little as $5.50 /kkg ($5/ton) of product for well-suited plants. Costs may rise to $22-$44/kkg ($20 to $40 /ton) for others requiring more capital expenditures and longer barging distances.

Deep-well disposal may be geologically feasible in some parts of the United States but not in others. Brine well salt producers have traditionally deep-welled their wastes. Any other disposal method would raise the disposal costs significantly. An economically feasible method for disposal of wastes from the Solvay soda ash plants is deep-welling. However, deep-welling must be in accordance with local, State and Federal regulations.

Treatment and disposal situations and costs for eastern and western United States differ widely. Water is scarce in most of the west and, therefore, is worth more for recovery and reuse. Pure water may be worth 5.3¢ to 13.2¢/cu m (20¢ to 50¢/1000 gal).

Another difference between eastern and western U.S. is that the West generally has less rainfall. Except for some coastal and isolated areas, western United States has a positive evaporation-rainfall differential. This positive differential makes it possible to dispose of water-borne wastes by solar evaporation. Disposal costs as low as 7.9¢/cu m (30¢/1000 gal) were given earlier in this section. Comparable deep welling costs are 19.3¢/cu m (73¢/1000 gal).

The location, character, and size of the company-owned land around the plant is becoming increasingly important. Many of the older plants in the inorganic chemical industry are built on small plots, surrounded by industrial and residential neighbors. Industries such as hydrofluoric acid, titanium dioxide and sodium

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dichromate have heavy solid waste loads but often limited storage capacity. Even where wastes can be successfully disposed of outside the premises, costs are higher than for plant site storage.

SECTION IX

EFFLUENT REDUCTION ATTAINABLE THROUGH THE APPLICATION OF THE BEST PRACTICABLE CONTROL TECHNOLOGY CURRENTLY AVAILABLE

The effluent limitations which must be achieved by July 1, 1977 are based on the degree of effluent reduction attainable through the application of the best practicable control technology currently available. For the inorganic chemical industry, this level of technology was based on the best existing performance by exemplary plants of various sizes, ages and chemical processes within each of the industry's product subcategories.

Best practicable control technology currently available emphasizes treatment facilities at the end of a manufacturing process but also includes the control technology within the process itself when it is considered to be normal practice within an industry. Examples of waste management techniques which were considered normal practice within the inorganic chemicals industry are:

a. manufacturing process controls
b. recycle and alternative uses of water
c. recovery and/or reuse of waste water constituents.

Consideration was also given to:

a. The total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application;
b. The size and age of equipment and facilities involved;
c. The process employed;
d. The engineering aspects of the application of various types of control techniques;
e. Process changes;
f. Non-water quality environmental impact (including energy requirements).

The following is a discussion of the best practicable treatment methods currently available for each of the chemical subcategories, and the effluent limitations on the significant pollutant parameters in their effluents.

EFFLUENT REDUCTION ATTAINABLE USING BEST PRACTICABLE TECHNOLOGY CURRENTLY AVAILABLE

Based upon the information contained in Sections III through VIII of this report, the following determinations were made on the degree of effluent reduction attainable by the application of the best practicable control technology currently available in the various subcategories of the inorganic chemicals industry.

General Water Guidelines

Process water is defined as any water directly contacting the reactants, intermediates, waste products, or end-products of a manufacturing process including contact cooling water. Not included in the guidelines are noncontact cooling water or ancillary waste streams resulting from steam and water supply. All values of guidelines and limitations presented below are expressed as kg of pollutant/kkg of product (lb/ton). While concentrations and flow are cited as the basis on which the guidelines were developed, the effluent limitations describe the allowable quantities of pollutants which may be discharged per unit of production. No limitations are established for either pollutant concentration or process waste water flow. The daily maximum limitation is double the thirty day average. Extensive, long-term data is not available for each of the 22 chemical subcategories. It was necessary, therefore, to rely on data from other segments of the inorganic chemicals industry, as well as data from other industrial categories. Based on this information and using good engineering judgement on the performance reliability of recommended treatment systems, a factor of two appears reasonable.

Aluminum Chloride

The process used for the manufacture of anhydrous aluminum chloride uses no water except in cases where a scrubber is employed to eliminate or reduce the discharge of unreacted chlorine gas. There are essentially three different grades of anhydrous aluminum chloride product made using the process of reacting chlorine gas with molten aluminum. The grey product is aluminum-rich, the white product is made from stoichiometric quantities of aluminum and chlorine, and the yellow product is chlorine-rich. The grey and white product manufacture releases little or no chlorine from the reactor and, therefore, dry collection methods can be employed to minimize air pollution. The manufacture of yellow product requires wet scrubbing to trap the excess chlorine gas.

An exemplary aluminum chloride plant uses a wet scrubber to produce a 28 percent aluminum chloride solution as a product for sale and has no water discharge. In cases where wet scrubbing is required and a favorable market for aluminum chloride solutions

does not exist, the scrubber effluent may be treated to precipitate the aluminum salts from solution. The supernatant may then be recycled to the scrubber. Since the volume of water discharged from the scrubber system in plant 125 is only 2720 l/day (720 gal/day), another treatment approach consists of concentrating the scrubbing water with respect to aluminum chloride by recycling and then evaporating to dryness to recover additional product.

The effluent limitations guidelines for aluminum chloride plants based on best practicable technology currently available require no discharge of process waste water pollutants to navigable waters.

Aluminum Sulfate

Aluminum sulfate is made by digesting bauxite ore or aluminum clays in sulfuric acid. The wastes emanating from this process consist of insolubles such as iron and silicon oxides. These wastes are removed during settling and filtration of the product alum solution and also during washdown of tanks. In two exemplary plants (049 and 063), the waste muds are ponded to settle the solids and the clear water is recycled to the process. No process waste water pollutants are discharged. Costs for the entire aluminum sulfate industry to achieve this level of pollution control average $0.90/ton of product, which is approximately 1.5 percent of the list price of aluminum sulfate.

While it is recognized that the raw waste load generated by the manufacture of aluminum sulfate increases when aluminum clays or other impure raw materials are used as the source of aluminum, the production process is the same as for bauxite ore. Therefore, the use of raw materials other than bauxite ore does not preclude adoption of the best practicable technology currently available. One plant using clay as its raw material is able to totally recycle its process water.

Because of the negative water balance associated with aluminum sulfate production, the pond supernatant may be totally recycled with no discharge of process waste water pollutants. Muds and other impurities settle out and allow the supernatant to be reused without a build-up of contaminants. A discharge allowance is provided to permit the discharge of rainwater in excess of evaporation. This water must be treated to a 25 mg/l suspended solids concentration on the average and be within the pH range of 6.0 to 9.0. An untreated discharge is allowed in the event of a catastrophic rainfall in excess of the maximum 24-hour, 10-year rainfall event.

The effluent limitations guidelines for aluminum sulfate plants based on best practicable technology currently available require

no discharge of process waste water pollutants to navigable waters.

No discharge of process waste water pollutants to navigable waters is also the effluent limitaion for plants producing iron-free alum. The production of iron-free alum requires pure raw metals, that is, iron-free sulfuric acid and iron-free hydrated alumina. The refining of the bauxite to produce the iron-free hydrated alumina yields wastes that must be segregated from the alum production process waters. The refining of bauxite to alumina is included in the nonferrous metal manufacturing point source category. Effluent guidelines for this refining process are presented therein.

Calcium Carbide

The data cited from plant 190 using an open furnace shows that the only manufacturing wastes involved are dusts emerging in tail gases from the furnaces. These are collected by dry bag filtration methods and are reused in the process or disposed of as solid wastes by landfilling. Dry bag collection of solid waste constitutes the best practicable control technology currently available. Because the segment of the calcium carbide industry covered herein is currently using this technology, no additional costs are required for treatment. Because plants manufacturing calcium carbide in covered furnaces typically recover the waste carbon monoxide, dry bag collection may be not universally applicable. Wet scrubbers are typically used to remove impurities from this gaseous stream. Hence, plants using covered furnaces are considered separately and wil be included in a forthcoming study.

The effluent limitations guidelines for calcium carbide plants using open furnaces based on best practicable technology currently available require no discharge of process waste water pollutants to navigable waters.

Calcium Chloride

Calcium chloride is produced by extraction from natural brine and as a by-product of soda ash manufacture by the Solvay Process. The guidelines presented herein apply only to the brine extraction process.

The process wastes are weak brine solutions, which emanate from the blowdown of various brine purification steps and from several evaporation steps used in the process. The best practicable treatment technology is to pass the waste brine streams through ponds to settle suspended solids and adjust pH. Final ponding is used to remove additional suspended solids before discharge. The process water discharge flow averages 330 l/kkg of product (79 gal/ton), and contains suspended solids but no harmful metals.

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The limitations are based on the performance of a well-designed and operated settling basin which will reduce the concentration of suspended solids to 25 mg/l. While it is recognized that significant quantities of dissolved solids may be present in the effluent, it was concluded that removal of these pollutants requires advanced treatment and expense beyond the definition of best practicable technology.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by calcium chloride plants using the brine extraction process:

TSS	0.0082 kg/kkg (0.0164 lb/ton)
pH	within the range 6.0 to 9.0

Calcium Oxide and Calcium Hydroxide

The manufacture of calcium oxide by the calcination of limestone is a dry process and uses only noncontact cooling water, and, in some cases, scrubber water. Plant 007 uses dry bag dust collectors and, therefore, discharges no process water. The use of dry bag collection methods is not contingent on the use of specific fuels for the calcination kilns nor is it geographically dependent. In plants with wet scrubbing systems already installed, the scrubbing solution may be reused in the process, or used to produce a low-grade product. One lime plant using wet scrubbers is able to completely recycle the scrubbing solution. Solids may be removed in settling vessels or ponds. For plants using ponds for treatment prior to reuse, a provision has been established to allow a discharge from impoundments in areas where rainfall exceeds evaporation. This discharge must be within the pH range of 6.0 to 9.0 and contain, on the average, a suspended solids concentration not to exceed 25 mg/l. In the event of a catastrophic rainfall exceeding the maximum 10-year, 24-hour event, an untreated discharge is allowed.

Plants using dry baghouses will not have to spend additional money to achieve the effluent reduction attainable by the application of best practicable technology currently available. Plants with wet scrubbers may have to invest up to an average of $1.28/ton of product.

The effluent limitations guidelines for calcium oxide and calcium hydroxide plants based on best practicable technology currently available require no discharge of process waste water pollutants to navigable waters.

Chlorine and Potassium or Sodium Hydroxide

(a) Diaphragm cell process

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The diaphragm cell process for the manufacture of chlorine and caustic soda or caustic potash usually have the following raw wastes emanating from the process:

a. a solution of sodium hypochlorite and sodium bicarbonate from the scrubbing of chlorine tail gases (about 7.5 kg of dissolved solids/kkg of chlorine produced).
b. chlorinated organics from the liquifaction of chlorine gas (about 0.7 kg/kkg of chlorine produced)
c. brine wastes from the brine purification system (about 12.2 kg of dissolved solids /kkg of chlorine produced)
d. spent sulfuric acid from the chlorine drying process (about 4.2 kg/kkg of chlorine produced)
e. weak caustic and brine solution from the caustic evaporators using barometric condensers (about 9.5 kg of dissolved solids/kkg of chlorine produced)
f. weak caustic and brine solution from the caustic filter washdown (about 37.5/kg of dissolved solids/ kkg of chlorine produced).

At plant 157, the tail gas scrubber wastes are presently discharged. However, the installation of a chlorine burning hydrochloric acid plant will eliminate the scrubber wastes. This addition is practicable, as substantiated by plant 157's plans for installation in the near future. The chlorinated organics are disposed of by incineration. The brine wastes from brine purification are ponded to settle out suspended solids and the brine liquor is recycled to brine make-up. The spent sulfuric acid at this plant is utilized elsewhere in the complex or may be sent to a spent sulfuric acid plant for regeneration. Some plants presently use this acid to partially neutralize caustic wastes in the plant which aides in controlling the effluent pH. The weak caustic/brine solution from the caustic evaporators can be eliminated by replacing the barometric condensers with noncontact surface condensers or by recycling the discharge from the barometric condenser back to brine make-up. The weak caustic/brine solution from the caustic filters is presently pH adjusted and discharged. Diaphragm cell chlorine plants will need to invest approximately $0.30/ton of chlorine produced to implement best practicable technology currently available.

Lead is sometimes present in the effluent as a result of cracks around protective resin seals which encase underlying lead mountings. Currently one-third of the industry is using anodes which eliminate the lead discharge. Industry representatives state that another one-third are seriously considering conversion. The lead limitation is the average value discharged from three plants which have not converted to lead-free anodes. The suspended solids limitation is based on a well-operated sedimentation vessel or pond designed to treat suspended solids to a 25 mg/l concentration.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by diaphragm cell chlor-alkali plants:

TSS	0.32 kg/kkg (0.64 lb/ton)
Lead	0.0025 kg/kkg (0.005 lb/ton) of chlorine
pH	within the range 6.0 to 9.0

(b) Mercury cell process

The mercury cell process for the manufacture of chlorine and caustic soda or caustic potash usually has similar wastes to the diaphragm cell process. The major exception is the loss of mercury from the process. Exemplary plants 144, 098 and 130 have excellent mercury control systems to minimize the incorporation of mercury into discharge streams. These controls consist of curbing the cell area to retain mercury lost in spills or leaks, collecting all mercury before ponding and discharge and/or recycling mercury-containing waste water back to the cells for reuse after treatment to remove any impurities. These plants have continuous mercury monitors on streams possibly contaminated that are meant for ponding to settle suspended solids before discharge. The mercury recommendation is twice the discharge performance achieved by the three plants studied, whose discharges per ton of chlorine are very similar. The mercury limitation represents the quantity of mercury discharged from the mercury treatment system. Residual mercury may be present in other portions of the plant and may contribute to the total mercury discharge. Residual mercury levels are difficult to quantify on a production basis and are, therefore, not the subject of the limitations presented below. Costs for the industry to achieve best practicable technology currently available are estimated to be $2.74/ton of chlorine produced.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by mercury cell chlor-alkali plants:

TSS	0.32 kg/kkg (0.65 lb/ton) of chlorine
Mercury	0.00014 kg/kkg (0.00028 lb/ton) of chlorine
pH	within the range 6.0 to 9.0

Hydrochloric Acid

The manufacture of hydrochloric acid by the chlorine burning process comprises a minor part of total U.S. production. All of the chlorine burning facilities are located within chlor-alkali complexes. Plant 121 is one such facility. The only waste generated from this process consists of weak hydrochloric acid, which is generated only during startup of the operation. No

waste emanates from the process during normal operation. The startup weak acid waste is normally neutralized with sodium hydroxide which yields dissolved solids (sodium chloride) amounting to about 0.5 kg/kkg (1 lb/ton) of product acid. The weak brine startup waste from the hydrochloric acid plant may be utilized in the brine make-up operation at the chlor-alkali portion of the complex, reused in acid manufacture.

Any leaks and spills must be contained and collected. If adequately segregated from other waste streams, the spills and leaks may be reused or sold. Good housekeeping, operation and maintenance will minimize or eliminate leaks and spills.

The effluent limitations guidelines for chlorine-burning hydrochloric acid plants based on best practicable technology currently available require no discharge of process waste water pollutants to navigable waters.

Hydrofluoric Acid

The manufacture of hydrofluoric acid by the reaction of fluospar (about 97 percent calcium fluoride) with sulfuric acid generates about 3.1-3.6 kkg (3.5 - 4.0 tons) of solid waste/kkg of product acid. All wastes from the process may be water slurried to settling ponds, and the clear liquid recycled. All process water can be segregated from noncontact cooling water. At least one plant in the industry uses this recycle technology to eliminate its process waste water discharge.

All leaks and spills must be contained and may be recycled, sold or pumped to the settling pond for treatment prior to reuse. Good housekeeping, operation, and maintenance will minimize or eliminate leaks and spills. A discharge is permitted from the impoundment if rainfall exceeds evaporation, or in the event of a catastrophic rainfall in excess of the maximum 24-hour, 10-year event. Except from discharges as a result of a catastrophic rainfall, the thirty-day average concentration of any effluent must not exceed 25 mg/l suspended solids and 15 mg/l fluoride. The pH must be within the range 6.0 to 9.0.

The effluent limitations guidelines for hydrofluoric acid plants based on best practicable technology currently available require no discharge of process waste water pollutants to navigable waters.

Hydrogen Peroxide

(a) Organic process

The organic process for the manufacture of hydrogen peroxide at plant 069 generates a waste stream containing 0.17-0.35 kg/kkg (0.34-0.70 lb/ton) of organics. The treatment methods currently

used at this plant include an 80 percent reduction of hydrogen peroxide to water and oxygen, a recovery system which recovers 60-70 percent of lost organics, and tank diking and process curbing to retain waste spills. The process water use in this facility is 16,000 l/kkg of product (3,800 gal/ton) and contains, after treatment, suspended solids and organic matter, but no harmful metals. The guidelines are based on the treatment systems used at plant 069 and the actual performance of these operations. The cost to implement these technologies is estimated to be $1.00/ton of product.

The following limitations constitute the quanitity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by organic process hydrogen peroxide plants:

TSS	0.40 kg/kkg (0.80 lb/ton)
TOC	0.22 kg/kkg (0.44 lb/ton)
pH	within the range 6.0 to 9.0

(b) Electrolytic process

There is only one plant in the U.S. that makes hydrogen peroxide by the electrolytic process. Plant 100 recovers all of the solids present in the process wastes and uses an ion exchange system to remove 98 percent of the cyanides present in the waste stream before discharge. The ion exchange regenerant is pH controlled prior to discharge. The effluent limitations are based on the performance of treatment systems employed at plant 100. Suspended solids are discharged in concentrations less than 25 mg/l and the oxidizable cyanide concentration averages 2 mg/l.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by electrolytic process hydrogen peroxide plants:

TSS	0.0025 kg/kkg (0.005 lb/ton)
Cyanide	0.0002 kg/kkg (0.0004 lb/ton)
pH	within the range 6.0 to 9.0

Nitric Acid

Commercial grade nitric acid (up to 70 percent concentration) is made by the oxidation of ammonia. At plant 114, all process waters are recycled with no discharge of process waste water pollutants. Of the 30,280 cu m (8 million gal) of water/day used for cooling, about 95 percent is recycled. An additional 757 cu m/day (0.02 mgd) are used to make steam and 75 percent of this quantity is recycled. About 87 cu m (23,000 gal)/day of steam condensate is used for acid make-up water. The discharge from the plant consists of noncontact cooling water which contains

blowdowns from boilers, cooling towers and water treatment with a total waste load amounting to about 2 kg/kkg (4 lb/ton) of product produced.

The best practicable treatment technology available for commercial grade nitric acid plants is the recycle of all process waters and the segregation of process waters from cooling water as demonstrated in plant 114. Volumes of waste water as a result of leaks and spills may be minimized or eliminated by good housekeeping, operation and equipment maintenance. These waste waters should be collected and may be recycled with the weak acid streams from condensers or may be sold as a weak acid product. It is estimated that $0.22/ton of product is required to implement these technologies.

The effluent limitations guidelines for plants producing nitric acid up to 70 percent concentration based on best practicable technology currently available require no discharge of process waste water pollutants to navigable waters.

Potassium Metal

Plant 045 produces most of the potassium metal manufactured in the U.S. by a completely dry process. No water is used. Therefore, the effluent limitations guidelines based on best practicable technology currently available require no discharge of process waste water pollutants to navigable waters.

Potassium Dichromate

The process for the production of potassium dichromate involves the reaction of potassium chloride with sodium dichromate. At plant 002, all process water is recycled and sodium chloride (400 kg/kkg of product) is removed as a solid waste. The only water-borne waste source is contamination of cooling water by hexavalent chromium in a barometric condenser presently in use on the product crystallizer. The plant has plans to replace the barometric condenser with a noncontact heat exchanger which will eliminate cooling water contamination. Best practicable technology currently available requires total recycle of process waste waters. The waste liquor from the salt concentrator may be recycled to the reaction mix tank. Chromium discharges may be eliminated by installing noncontact heat exchangers. Costs to implement these technologies are estimated to be $4.65/ton of product. This is approximately one percent of the list price of potassium dichromate.

The effluent limitations guidelines for potassium dichromate plants based on best practicable technology currently available require no discharge of process waste water pollutants to navigable waters.

Potassium Sulfate

All of the potassium sulfate manufacturers in the U.S. are located in the arid southwest near deposits of langbeinite ore ($K_2SO_4 \cdot 2MgSO_4$). The reaction of this ore with a potassium chloride solution and the subsequent crystallization and separation of potassium sulfate from magnesium chloride brine constitutes the process for the production of potassium sulfate. A large amount (about 2000 kg/kkg of product) of magnesium chloride brine is a co-product of this process. Plant 118 sells most of this brine when the sodium content of the ore is low. It ponds the brine for evaporation when it cannot be sold. Evaporation ponds in this area of the country are feasible. The cost of water is a problem and most of the liquor in the brine is recycled back to the process for reuse before the magnesium chloride is sold or dumped. Other insoluble wastes from the process muds amount to about 15 kg/kkg of product, and they are landfilled. Because of the geographical dependence of plants manufacturing potassium sulfate to the arid southwest evaporation ponds are considered to be the best practicable technology currently available.

The effluent limitations guidelines for potassium sulfate plants based on best practicable technology currently available require no discharge of process waste water pollutants to navigable waters.

Sodium Bicarbonate

Sodium bicarbonate is manufactured by the carbonation of a sodium carbonate solution. Most plants are located in or near complexes manufacturing soda ash by the Solvay Process. There is one isolated facility which uses mined soda ash as a raw material. Plant 166 is located within a Solvay Process complex. The major wastes from this process are about 10 kg of undissolved sodium bicarbonate/kkg of product and an average of about 38 kg of dissolved sodium bicarbonate/kkg of product. Some of the undissolved sodium bicarbonate is reusable and it is redissolved and recycled to the process. The remainder is landfilled along with sand from the filters and other non-process solid waste. The weak slurry thickener overflow, which constitutes their present source of waste, may be used as a source of liquid for the product dryer scrubber. Recycling this liquid to concentrate it with respect to sodium carbonate will enable it to be reused in the process. These process changes will eliminate the discharge of process waste waters. One plant plans to incorporate this technology into its manufacturing process.

Costs for implementation of best practicable technology currently available are expected to be offset by recovered product values.

The effluent limitations guidelines for sodium bicarbonate plants based on best practicable technology currently available require no discharge of process waste water pollutants to navigable waters.

Sodium Carbonate

The Solvay Process for the manufacture of sodium carbonate (soda ash) involves the reaction of sodium chloride brine, ammonia and carbon dioxide to yield crude soda ash. The ammonia is recovered from the process by reacting the spent brine solution with lime followed by distillation. This process produces about 1500 kg of dissolved solids waste/kkg of soda ash manufactured. Calcium chloride comprises the majority of this waste, amounting to about 1050 kg for every kkg of soda ash. Plant 166 recovers about 21 percent of the waste calcium chloride for sale. The total recovery of calcium chloride is not practical because of the limited market. The only treatment used at this plant is a settling pond to reduce the concentration of suspended solids in the effluent. Therefore the effluent limitations guidelines are not based on by-product recovery, but upon the water flow necessary to maintain the total calcium chloride by-product formed in the process at a 10 percent concentration at discharge 900 l/kkg of soda ash (1,650 gal/ton). Suspended solids but no harmful metals may also be present. Large quantities of dissolved solids, primarily chlorides, are generally present in the effluent. Considering the available treatment technologies to remove chlorides and their associated costs, it was concluded that, in this case, dissolved solids removal is beyond the scope of best practicable technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by sodium carbonate plants using the Solvay Process:

TSS	0.17 kg/kkg (0.34 lb/ton)
pH	within the range 6.0 to 9.0

Sodium Metal

The process for the manufacture of sodium metal, commonly called the Downs Cell Process, is essentially dry. However, water-borne wastes are generated during cleanout and washdown of cells when the electrolyte is replenished, from scrubbing chlorine tail gases and from drying the chlorine with sulfuric acid. At plant 096, the spent drying acid is not discharged but used elsewhere in the works complex. The wastes from cell wash-downs, runoff water and residual chlorine-containing water from the tail gas scrubber are ponded to settle suspended solids and then discharged. At plants where the utilization of the spent drying acid and calcium hypochlorite solution is not possible, the spent

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acid may be recovered or sold to a "decomp" sulfuric acid plant and the calcium hypochlorite solution be recovered and marketed as a bleach product. The limitations are based on the discharge volume of process water other than barometric condensers which contributes only small quantities of TSS. Treatment of the process water in well-designed settling basins to a 25 mg/l concentration is considered to be best practicable technology currently available.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by sodium metal manufacture plants:

TSS	0.23 kg/kkg (0.46 lb/ton)
pH	within the range 6.0 to 9.0

Sodium Chloride

(a) Solar evaporation process

Solar salt is produced by the long-term solar evaporation of sea water to precipitate sodium chloride. This process generates a bittern waste solution consisting mainly of sodium, potassium and magnesium salts. Plant 059 reclaims some of the waste salts from the bitterns and stores the rest for future reclamation. Because this impoundment procedure is dependent on the availability of large areas of land for storage ponds, it may not be generally applicable. Until recovery of magnesium and potassium values proves economical, unused bitterns may be returned to the source of the original brine solution provided that no additional pollutants are added.

(b) Solution brine-mining process

Sodium chloride manufacture by this process involves pumping water into an underground salt deposit (solution mining) and returning the brine for treatment to remove impurities. Multiple effect evaporators are used to crystallize and collect the pure sodium chloride for sale. At plant 030, the brine sludges from the brine purification step are disposed of by returning them to the mine. Other sources of waste water are the purges from the evaporators, spills and the barometric condenser. All of the concentrated brine wastes are recycled to the process. The current plant effluent is neutral in pH and low in suspended solids. Best practicable technology currently available consists of treating the solid-containing waste streams in a well-designed and operated settling pond.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently

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available by solution mining evaporative process sodium chloride plants:

TSS	0.15 kg/kkg (0.30 lb/ton)
pH	within the range 6.0 to 9.0

Sodium Dichromate and Sodium Sulfate

These two chemicals are manufactured as co-products by the calcination of a mixture of chrome ore, soda ash and lime followed by water leaching and acidification of the soluble chromates. The sodium sulfate product is crystallized out after acidification. The bulk of the waste originates from the undigested portions of the ore and is mostly solid wastes. Water-borne wastes arising from spills and washdowns contain most of the hexavalent chromium. Treatment at plant 184 consists of containment of spills, leaks and rain water runoff in chromate areas of the plant, followed by treating the chromium-containing waste water with pickle liquor to affect reduction of the chromates and then lagooning to settle suspended solids before discharge. This treatment removes 99 percent of the hexavalent chromium. Dichromate plant 014 uses the more conventional sodium hydrosulfide treatment to reduce the hexavalent chromium. Subsequent lime treatment limits the discharge to the solubility limits of calcium sulfate (2000 mg/l) and about 0.05 mg/l of unreacted hexavalent chromium and a total chromium level of 0.44 mg/l. The effluent limitations are based on chromium treatment to these levels and suspended solids removal in a well-operated settling basin, designed to reduce TSS to a 25 mg/l concentration. Costs to achieve this treatment level are estimated to be $16/ton of sodium dichromate which is about 4.6 percent of its list price.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by sodium dichromate and sodium sulfate coproduct plants:

TSS	0.22 kg/kkg (0.44 lb/ton)
Cr (+6)	0.0009 kg/kkg (0.0018 lb/ton)
Cr (T)	0.0044 kg/kkg (0.0088 lb/ton)
pH	within the range 6.0 to 9.0

Sodium Silicate

Sodium silicate is produced by the reaction of soda ash and silica in a furnace to form a sodium silicate glass. The material is sold either as a solid glass product or is pressure dissolved in water and sold as a solution with various ratios of silica to sodium oxide. The water-borne waste generated consists of unreacted silica, sodium hydroxide and sodium silicate from

tank washdowns, product shock cooling with water and scrubber effluent. At plant 072, these wastes are ponded to settle the solids and the clear liquid is partially recycled. Best practicable technology currently available consists of sedimentation and neutralization of the effluent. The suspended solids settle efficiently and the waste water should contain only dissolved sodium sulfate and virtually no sodium silicate.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable technology currently available by sodium silicate plants:

TSS	0.005 kg/kkg (0.01 lb/ton)
pH	within the range 6.0 to 9.0

Sodium Sulfite

Sodium sulfite is manufactured by the reaction of sulfur dioxide with soda ash. The process wastes are mainly sulfides from product purification and sodium sulfite/sodium sulfate solutions from the product dryer ejector, filter washings and vessel cleanouts. Plant 168 is the only sodium sulfite plant currently treating the waste sulfite-containing solutions to oxidize sulfite to sulfate. The efficiency of this aeration treatment is about 94 percent. This treatment reduces the COD to the level required by best practicable technology currently available. An additional filtration treatment is given to the process waste water which removes 98 percent of the suspended solids. This treatment reduces TSS to below 25 mg/l. The limitations are based on the waste stream emanating from the dryer ejector and filter wash operations of this plant at the high end of its range (630 l/kkg or 150 gal/ton).

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by sodium sulfite plants:

TSS	0.016 kg/kkg (0.032 lb/ton)
COD	1.7 kg of dichromate ion/kkg
pH	within the range 6.0 to 9.0

Sulfuric Acid

Sulfuric acid is manufactured using the sulfur-burning contact process by three different types of plants. These are single absorption plants, double absorption plants and spent acid plants. The guidelines presented herein do not apply to spent acid plants or by-product sulfuric acid production, as in copper smelting operations.

Plant 141 is a single absorption plant and plant 086 is a double absorption plant. The double absorption plant has no process waste and uses only noncontact cooling water. The single absorption plant requires the use of wet scrubbing to minimize air pollution, and the scrubber water is recycled. There is no discharge of process waste water from these plants. A sulfuric acid plant in Finland neutralizes its scrubber water. The salt solution is then concentrated into fertilizer feed. Leaks and spills may be minimized or eliminated by good housekeeping, operation and equipment maintenance. Leaks should be segregated from other waste streams and may be reused in the process or sold as a weak acid solution.

The effluent limitations guidelines for single and double absorption sulfur burning sulfuric acid plants based on best practicable technology currently available require no discharge of process waste water pollutants to navigable waters.

Titanium Dioxide

a) Chloride process

Chloride process plant 009 uses neutralization, clarification and ponding to settle suspended solids and to precipitate metals. About 93 percent of the cooling water is recycled but there appears to be no practical approach for recycling process water. Deep well disposal is utilized by another company (plant 160). The plant effluent is neutral pH and contains mostly sodium chloride as the dissolved solid.

Best practicable technology currently available consists of lime treatment and sedimentation to reduce the iron concentration to 4 mg/l and the TSS to 25 mg/l. The guidelines are only applicable to discharges resulting from titanium dioxide production. They do not include any wastes resulting from ore beneficiation. In some cases, all titanium tetrachloride is not used to produce titanium dioxide. The guidelines include only those wastes which may be attributed to titanium dioxide production.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by titanium dioxide plants using the chloride process:

TSS	2.2 kg/kkg (4.4 lbs/ton)
Iron	0.36 kg/kkg (0.72 lb/ton)
pH	within the range 6.0 to 9.0

b) Sulfate process

The high iron content in the ilmenite ore raw material is a major source of the wastes generated by this process. Another major

contributor to the process waste is the large amount of spent sulfuric acid from digestion of the ore. Very little treatment is presently being used and The effluents from these plants are highly acidic and contain high concentrations of suspended and dissolved solids including metal ions. Ocean barging is used by some to dispose of the process waste waters. Plant 122 is presently installing treatment facilities to neutralize and oxidize the process waste to remove acid as calcium sulfate, to reduce the chemical oxygen demand and reduce the concentration of harmful metal ions. Additional settling ponds are planned to reduce the quantities of suspended solids formed during the neutralization treatment. Considerable research is being done to improve treatment technologies for this process. Best practicable technology currently available consists of lime neutralization and settling. This treatment system will remove iron and suspended solids, while coprecipitating other metal ions such as vanadium, chromium, and manganese. The limitations are based on a suspended solids concentration of 50 mg/l and an iron concentration of 4 mg/l. A flow basis of 210,000 l/kkg was used. This flow may be achieved by recycling scrubber water to the process.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after application of the best practicable control technology currently available by sulfate process titanium dioxide plants:

TSS	10.5 kg/kkg (21.0 lb/ton)
Iron	0.84 kg/kkg (1.68 lb/ton)
pH	within the range 6.0 to 9.0

SECTION X

EFFLUENT REDUCTION ATTAINABLE THROUGH THE APPLICATION OF THE BEST AVAILABLE TECHNOLOGY ECONOMICALLY ACHIEVABLE,

The effluent limitations which must be achieved by July 1, 1983 are based on the degree of effluent reduction attainable through the application of the best available technology economically achievable. For the inorganic chemical industry, this level of technology was based on the best control and treatment technology employed by a point source within the product subcategory, or where it is readily transferable from one industry process to another.

The following factors were taken into consideration in determining the best available technology economically achievable:

a. the age of equipment and facilities involved;
b. the process employed;
c. the engineering aspects of the application of various types of control techniques;
d. process changes;
e. cost of achieving the effluent reduction resulting from application of the best available technology economically achievable; and
f. non-water quality environmental impact (including energy requirements).

In contrast to the best practicable technology currently available, best available technology economically achievable assesses the availability in all cases of in-process controls as well as control or additional treatment techniques employed at the end of a production process. In-process control options available which were considered in establishing these control and treatment technologies include the following:

a. alternative water uses
b. water conservation
c. waste stream segregation
d. water reuse
e. cascading water uses
f. by-product recovery
g. reuse of waste water constituent
h. waste treatment
i. good housekeeping
j. preventive maintenance
k. quality control (raw material, product, effluent)
l. monitoring and alarm systems.

Those plant processes and control technologies which at the pilot plant, semi-works, or other level, have demonstrated both technological performances and economic viability at a level sufficient to reasonably justify investing in such facilities were also considered in assessing the best available technology economically achievable. It is the highest degree of control technology that has been achieved and has been demonstrated to be capable of being designed for plant scale operation. Although economic factors are considered in this development, the costs for this level of control are intended to be for the top-of-the line of current technology subject to limitations imposed by economic and engineering feasibility. However, this technology may necessitate some industrially sponsored development work prior to its application.

EFFLUENT REDUCTION ATTAINABLE USING BEST AVAILABLE TECHNOLOGY ECONOMICALLY ACHIEVABLE

Based upon the information contained in Sections III through IX of this report, the following determinations were made on the degree of effluent reduction attainable by the application of the best available control technology economically achievable in the various categories of the inorganic chemical industry.

General Water Guidelines

Process water is defined as any water contacting the reactants of a process including contact cooling water. All values of guidelines and limitations presented below are expressed as thirty-day averages in units of kg of parameter per metric ton (lbs/ton) of product produced. The daily maximum limitation is double the monthly average, as discussed in section IX. For those subcategories which utilize impoundments to achieve no discharge of process waste water pollutants, an untreated discharge is allowed in the event of a catastrophic rainfall exceeding the maximum 25 year, 24 hour rainfall event.

No discharge of process waste water pollutants to navigable waters is attainable by the application of the best practicable technology currently available for the following chemical subcategories:

- aluminum chloride
- aluminum sulfate
- calcium carbide
- calcium oxide and calcium hydroxide
- hydrochloric acid
- hydrofluoric acid
- nitric acid
- potassium metal
- potassium dichromate
- potassium sulfate
- sodium bicarbonate
- sulfuric acid

The same effluent reduction is required for these subcategories based on best available technology economically ahcievable.

Calcium Chloride

Best available technology economically achievable includes recycle of the packaging area washdown water and use of noncontact heat exchangers. These process changes are being planned by plant 185.

Therefore, the effluent limitations guidelines for calcium chloride based on the application of the best available technology economically achievable require no discharge of process waste water pollutants to navigable waters.

Hydrogen Peroxide

a) Organic process

Best available technology for organic process hydrogen peroxide plants is to recycle all process water. The discharged process water presently contains hydrogen peroxide and organic solvent which should not be detrimental to the process. Carbon adsorption techniques may be applied if necessary prior to water reuse. The effectiveness of this treatment for organic removal has been widely demonstrated.

The effluent limitations guidelines for hydrogen peroxide production by the organic process based on the application of the best available technology economically achievable require no discharge of process waste water pollutants to navigable waters.

b) Electrolytic process

Best available technology for this process is segregation of the process waste water from the cooling water discharge, treatment of the relatively small amount of process waste water by distillation. The distillate may be reused in the process. This is feasible because the process waste water flow is only 95 l/kkg (25 gal/ton) in the one plant using this process.

The effluent limitations guidelines for electrolytic process hydrogen peroxide plants based on the application of the best available technology economically achievable require no discharge of process waste water pollutants to navigable waters.

Sodium Carbonate

The calcium chloride raw waste load of the Solvay process is such that 10-15 percent of it can supply the total volume of the current U.S. market for calcium chloride, so the potential for waste disposal through this channel may be limited. Large capital costs are involved to bring Solvay process plants to the capability of zero discharge, and the disposal of the by-product calcium chloride is difficult due to its extreme solubility. However, technology does exist to further reduce the concentration of suspended solids in the effluent to 15 mg/l or to reduce the volume of process water required.

The following limitations constitute the quantity or quality of pollutants or pollutant properties which may be discharged after the application of best available technology economically achievable for soda ash produced by the Solvay process:

TSS	0.10 kg/kkg (0.20 lb/ton)
pH	within the range 6.0 to 9.0

Sodium Chloride

a) Solar evaporation process

Consistent with the effluent reduction attainable by the application of best practicable technology, unused bitterns may be returned to the brine source provided no additional pollutants are added.

b) Solution brine-mining process

The major source of the discharged sodium chloride dissolved solids waste generated at plant 030 emanates from carryover in the barometric condensers. The best available technology economically achievable for brine mining evaporative process sodium chloride plants is to replace the barometric condensers with noncontact heat exchangers and recycle the steam condensate to the evaporators. The effluent limitations guidelines for evaporative process sodium chloride plants based on the application of the best available technology economically achievable require no discharge of process waste water pollutants to navigable waters.

Sodium Metal

Best available technology for sodium metal plants is:

a. Recycle of the wastes from cell washdowns to brine purification after removal of suspended solids.
b. Recovery of the calcium hypochlorite waste from the tail gas scrubber as a product and recycle of water to the scrubber, or replace the scrubber with a chlorine-burning hydrochloric acid facility.

c. Recycle the spent sulfuric acid used for drying the chlorine to a "decomp" sulfuric acid plant or sale as a weak acid solution.

Implementation of these technologies will eliminate the discharge of process waste water pollutants.

The effluent limitations guidelines for sodium metal-chlorine plants based on the application of the best available technology economically achievable require no discharge of process waste water pollutants to navigable waters.

Sodium Sulfite

Best available technology for sodium sulfite plants is recovery of the sodium sulfate from the waste discharge by evaporation and sale as a by-product or satisfactory land disposal. This should not be too costly since the volume of effluent from plant 168, for example, averages only 1426.5 cu m/day (3700-7000 gal/day), and the dissolved solids in this stream are mostly sodium sulfate.

The effluent limitations guidelines for sodium sulfite plants based on the application of the best available technology economically achievable require no discharge of process waste water pollutants to navigable waters.

Chlorine and Sodium or Potassium Hydroxide

a) Diaphragm cell process

Best practicable technology currently available for the manufacture of chlorine and caustic soda or caustic potash by the diaphragm cell process allows the discharge of treated wastes from the tail gas scrubber and of neutralized spent acid from chlorine drying. Best available technology is elimination of the pollutant discharge by:

a. Catalytic treatment of the hypochlorite waste from the scrubber to convert to a brine and recycle to brine purification, recovery of the hypochlorite as a bleach product or elimination of the scrubber and utilization of the chlorine gas elsewhere in the plant, such as in a chlorine-burning hydrochloric acid plant;
b. Recovery of the spent acid from chlorine drying and sale, utilization elsewhere in the plant or return to spent sulfuric acid plant for regeneration; and
c. Recycle of all weak brine/caustic solutions to the process after extraction/elimination of harmful metals and impurities.

The effluent limitations guidelines for diaphragm cell chlor-alkali plants based on the application of the best available technology economically achievable require no discharge of process waste water pollutants to navigable waters.

b) Mercury cell process

The same technologies cited above for diaphragm cell plants apply to mercury cell plants.

The effluent limitations guidelines for mercury cell chlor-alkali plants based on the application of the best available technology economically achievable require no discharge of process waste water pollutants to navigable waters.

Sodium Dichromate and Sodium Sulfate

At plant 184, a total of approximately 113,000 kkg of product and by-product are manufactured annually. The additional treatment cost to this plant for the evaporation of the effluent to effect zero discharge would amount to about $250,000/yr. This would mean an approximate cost of $2.20/kkg of sodium dichromate and sodium sulfate.

The effluent limiations guidelines for sodium dichromate and byproduct sodium sulfate plants, based on the application of the best available technology economically achievable require no discharge of process waste water pollutants to navigable waters.

Titanium Dioxide

As indicated in Section VIII of this report, the additional treatment costs projected to bring each of these processes (chloride and sulfate) to zero discharge of process waste water pollutants by demineralization and evaporation of regenerant solutions are as follows:

a. Chloride process - an additional $730,000 per year for a plant with a 24,300 kkg (27,000 ton) per year capacity or an increase of approximately 5 percent over the costs of best practicable technology.
b. Sulfate process - an additional $620,000 per year for a plant with a 39,600 kkg (43,000 ton) per year capacity or an increase of approximately 3 percent over the costs of best practicable technology

However, evaporation of the large amounts of water necessary in both processes would consume large amounts of energy and solid waste disposal costs are high. The technology does exist to further reduce the concentration of suspended solids and iron.

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Best available technology economically achievable consists of water conservation and more efficient suspended solids removal than required by the 1977 standard. The following limitations constitute the quantity of pollutants which may be discharged after application of the best available technology economically achievable by titanium dioxide plants:

a. Chloride Process:

TSS	1.3 kg/kkg (2.6 lbs/ton)
Iron	0.18 kg/kkg (0.36 lb/ton)
pH	within the range 6.0 to 9.0

b. Sulfate Process:

TSS	5.3 kg/kkg (10.6 lbs/ton)
Iron	0.42 kg/kkg (0.84 lb/ton)
pH	within the range 6.0 to 9.0

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SECTION XI

NEW SOURCES PERFORMANCE STANDARDS AND PRETREATMENT STANDARDS,

The term "new source" is defined in the Act to mean "any source, the construction of which is commenced after the publication of proposed regulations prescribing a standard of performance". The treatment technology for new sources is evaluated by adding to the considerations underlying the identification of best available technology economically achievable, a determination of what higher levels of pollution control are available through the use of improved production processes and/or treatment techniques. Thus, in addition to considering the best in-plant and end-of-process control technology, new source performance standards reflect how the level of effluent may be reduced by changing the production process itself. Alternative processes, operating methods or other alternatives were considered. However, the end result of the analysis identifies effluent standards which reflect levels of control achievable through the use of improved production processes (as well as control technology), rather than prescribing a particular type of process or technology which must be employed.

The following factors were considered in assessing the best demonstrated control technology currently available for new sources:

(a) the type of process employed and process changes;
(b) operating methods;
(c) batch as opposed to continuous operations;
(d) use of alternative raw materials and mixes of raw materials;
(e) use of dry rather than wet processes (including substitution of recoverable solvents for water); and
(f) recovery of pollutants as by-products.

In addition to the effluent limitations covering discharges directly into waterways, the constituents of the effluent discharge from a plant within the industrial category which would interfere with, pass through, or otherwise be incompatible with a well-designed and operated publicly owned activated sludge or trickling filter waste water treatment plant were identified.

EFFLUENT REDUCTION ATTAINABLE BY THE APPLICATION OF THE BEST AVAILABLE DEMONSTRATED CONTROL TECHNOLOGIES, PROCESSES, OPERATING METHODS OR OTHER ALTERNATIVES.

Based upon the information contained in Sections III through X of this report, the following determinations were made on the degree of effluent reduction attainable with the application of new source standards for the various subcategories of the inorganic chemicals industry.

No discharge of process waste water pollutants to navigable waters is the new source performance standard for the following chemical subcategories:

aluminum chloride
aluminum sulfate
calcium carbide
hydrochloric acid
hydrofluoric acid
calcium oxide and calcium hydroxide
nitric acid
potassium metal
potassium dichromate
potassium sulfate
sodium bicarbonate
sulfuric acid

This is achievable by the application of the best practicable technology currently available.

The new source performance standards for the following chemicals require no discharge of process waste water pollutants to navigable waters:

calcium chloride
hydrogen peroxide
sodium metal
sodium chloride
a) solution brine-mining process

This standard may be achieved by the incorporation of best available technologies economically achievable into new sources. The technologies, as outlined in Section X, have been demonstrated and may be included in the design of new sources.

Chlorine

New source performance standards for chlorine are based on the application of best practicable technology currently available, as summarized in Section IX. Metal anodes may be used to eliminate the discharge of lead, as required for new plants.

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Sodium Carbonate

An alternative process for the manufacture of soda ash with no discharge of process waste water pollutants exists, the mining and processing of trona. Because of this, no discharge of process waste water pollutants to navigable waters is the new source performance standard for this manufacturing process. The calcium chloride raw waste load of the Solvay process is such that 10 to 15 percent of it can supply the total volume of the U.S. market. Large capital costs are involved to bring Solvay process plants to the capability of no discharge, and the disposal of the unmarketable by-product calcium chloride is difficult due to its extreme solubility. No new Solvay process plants have been built in forty years. The supply of trona ore is adequate to satisfy the demand for sodium carbonate.

Sodium Chloride

The new source performance standards represent the effluent reduction attainable by the application of the best practicable technology currently available as described in Section IX.

Sodium Dichromate and Sodium Sulfate

The new source performance standards for sodium dichromate and by product sodium sulfate plants represent the application of best practicable technology currently available and require good water conservation which is possible in the construction of new facilities.

The new source performance standards for this subcategory are:

TSS	0.15 kg/kkg (0.3 lb/ton)
Cr (T)	0.0044 kg/kkg (0.0088 lb/ton)
Cr (+6)	0.0005 kg/kkg (0.001 lb/ton)
pH	within the range 6.0 to 9.0

Titanium Dioxide (Chloride and Sulfate Processes)

Although research is currently being conducted to determine the feasibility of acid recovery and recycle of process water, many problems remain unsolved. As such, it is not considered feasible to require this technology to be incorporated into new facilities. The new source performance standards for titanium dioxide require the same degree of effluent reduction attainable by the application of best available technology economically achievable, as presented in Section X. This technology is demonstrated and may be applied to new sources.

PRETREATMENT STANDARDS FOR NEW SOURCES

Plants whose waste water discharges are characterized by the presence of materials that interfere with operation of biological systems are not suited to use of conventional secondary waste

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treatment. Extreme segregation (that is, limiting the sewered discharge to sanitary and other organic wastes) or pretreatment is required by such manufacturing plants.

The pretreatment standards for new sources in the inorganic chemicals manufacturing category are the standards set forth in 40 CFR 128. In addition to these standards, however, the pretreatment standard for incompatible pollutants is the new source performance standard. If a publicly owned treatment works is committed to remove a specified percentage of any incompatible pollutant, the pretreatment standard is correspondingly reduced in stringency for that pollutant.

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SECTION XII

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SECTION XIII

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SECTION XIV

GLOSSARY

Acidity

The total titratable hydrogen ion content of the solution is defined as the acidity. Acidity is expressed in mg/l of free hydrogen ion.

Adsorption

Condensation of the atoms, ions or molecules of a gas, liquid or dissolved substance on the surface of a solid called the adsorbent. The best known examples are gas/solid and liquid/solid systems.

Air Pollution

The presence in the air of one or more air contaminants in quantities injurious to human, plant, animal life, or property, or which unreasonably interferes with the comfortable enjoyment thereof.

Alkalinity

Total titratable hydroxyl ion concentration of a solution. In water analysis, alkalinity is expressed in mg/l (parts per million) of calcium carbonate.

Ash

The solid residue left after incineration in the presence of oxygen.

Bag Filter

A dry collection device for recovery of particulate matter from gas streams.

Barometric Condenser

Device, operating at barometric pressure, used to change vapor into liquid by cooling.

Blowdown

The minimum discharge of recirculating water for the purpose of discharging materials contained in the water, the further build-up of which would cause concentration in amounts exceeding limits established by best engineering practice.

Brine

An aqueous salt solution.

Calcination

The roasting or burning of any substance to bring about physical or chemical changes; e.g., the conversion of limestone to quicklime.

Carbonation

Treatment with carbon dioxide gas.

Catalytic Converter

A unit containing a packed or fluidized bed of catalyst.

Caustic

Capable of destroying or eating away by chemical action. Applied to strong bases and characterized by the presence of hydroxyl ions in solution.

Centrifuge

A device having a rotating container in which centrifugal force separates substances of differing densities.

Chemical Oxygen Demand, COD

Its determination provides a measure of the quantity of oxygen required to oxidize the organic matter (or other oxidizable matter) in a waste sample, under specific conditions of oxidizing agents, temperature and time. The general method is applied to waste samples having an organic carbon concentration greater than 15 mg/l.

Coke

The carbonaceous residue of the destructive distillation (carbonization) of coal or petroleum.

Conditioning

A physical and/or chemical treatment given to water used in the plant or discharged.

Conductivity, Electrical

The ability of a material to conduct a quantity of electricity transferred across a unit area, per unit potential gradient per

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unit time. In practical terms, it is used for approximating the salinity or total dissolved solids content of water.

Cooling Water

Water which is used to absorb waste heat generated in the process. Cooling water can be either contact or noncontact.

Copperas

Ferrous sulfate.

Cyclone Separator

A mechanical device which removes suspended solids from gas streams.

Demineralization

The removal from water of mineral contaminants usually present in ionized form. The methods used include ion-exchange techniques, flash distillation or electrolysis.

Electrostatic Precipitator

A gas cleaning device using the principle of placing an electrical charge on a solid particle which is then attracted to an oppositely-charged collector plate.

Filtrate

Liquid after passing through a filter.

Filtration

Removal of solid particles from liquid or particles from air or gas stream through a permeable membrane.

Flocculation

The combination of aggregation of suspended solid particles in such a way that they form small clumps. The term is used as a synonym for coagulation.

Fluidized Bed Reactor

A reactor in which finely divided solids are caused to behave like fluids due to their suspension in a moving gas or liquid stream.

Gas Washer (or Wet Scrubber)

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Apparatus used to remove entrained solids and other substances from a gas stream.

Hardness (Total)

The characteristic of water generally accepted to represent the total concentration of calcium and magnesium ions, usually expressed as mg/l of calcium carbonate.

Heavy Metal

One of the metal elements not belonging to the alkali or alkaline earth group. In this study, the classification includes titanium, vanadium, iron, nickel, copper, mercury, lead, cadmium, and chromium.

Ion Exchange

A reversible chemical reaction between a solid and a fluid by means of which ions may be interchanged from one substance to another. The customary procedure is to pass the fluid through a bed of the solid, which is granular and porous and has a limited capacity for exchange. The process is essentially a batch type in which the ion exchanger, upon nearing depletion, is regenerated by inexpensive salts or acid.

Kiln (Rotary)

A large cylindrical mechanized type of furnace used for calcination.

Membrane

A thin sheet of synthetic polymer, through the apertures of which small molecules can pass, while larger ones are retained.

Mother liquor

The solution from which crystals are formed.

Multi-Effect Evaporator

In chemical processing installations, requiring a series of evaporations and condensations, the individual units are set up in series and the latent heat of vaporization from one unit is used to supply energy for the next. Such units are called "effects" in engineering parlance as, e.g., a triple effect evaporator.

Oleum or Fuming Sulfuric Acid

A solution of sulfur trioxide in sulfuric acid.

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pH

Is a measure of the relative acidity or alkalinity of water. A pH value of 7.0 indicates a neutral condition; less than 7 indicates a predominance of acids, and greater than 7, a predominance of alkalis. There is a 10-fold increase (or decrease) from one pH unit level to the next, e.g., 10-fold increase in alkalinity from pH 8 to pH 9.

Plant Effluent or Discharge after Treatment

The waste water discharged from the industrial plant. In this definition, any waste treatment device (pond, trickling filter, etc.) is considered part of the industrial plant.

Pretreatment

The necessary processing given materials before they can be properly utilized in a process or treatment facility.

Process Effluent or Discharge

The volume of waste water emerging from a particular use in the plant.

Process Water

Water which is used in the internal plant streams from which products are ultimately recovered, or water which contacts either the raw materials or product at any time.

Reverse Osmosis

A method involving application of pressure to the surface of a saline solution forcing water from the solution to pass from the solution through a membrane which is too dense to permit passage of salt ions. Hollow nylon fibers or cellulose acetate sheets are used as membranes since their large surface areas offer more efficient separation.

Sedimentation

The falling or settling of solid particles in a liquid, as a sediment.

Settling Pond

A large shallow body of water into which industrial waste waters are discharged. Suspended solids settle from the waste waters due to the large retention time of water in the pond.

Sintering

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The agglomeration of powders at temperatures below their melting points. Sintering increases strength and density of the powders.

Slaking

The process of reacting lime with water to yield a hydrated product.

Sludge

The settled mud from a thickener clarifier. Generally, almost any flocculated, settled mass.

Slurry

A watery suspension of solid materials.

Sniff Gas

The exhaust or tail gas effluent from the chlorine liquefaction and compression portion of a chlor-alkali facility.

Solute

A dissolved substance.

Solvent

A liquid used to dissolve materials.

Thickener

A device or system wherein the solid contents of slurries or suspensions are increased by evaporation of part of the liquid phase, or by gravity settling and mechanical separation of the phases.

Total Dissolved Solids (TDS)

The total amount of dissolved solid materials present in an aqueous solution.

Total Organic Carbon, TOC

A measurement of the total organic carbon content of surface waters, domestic and industrial wastes, and saline waters.

Total Suspended Solids (TSS)

Solid particulate matter found in waste water streams, which, in most cases, can be minimized by filtration or settling ponds.

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Turbidity

A measure of the opacity or transparency of a sediment-containing waste stream. Usually expressed in Jackson units or Formazin units which are essentially equivalent in the range below 100 units.

Wet Scrubbing

A gas cleaning system using water or some suitable liquid to entrap particulate matter, fumes, and absorbable gases.

Waste Discharged

The amount (usually expressed as weight) of some residual substance which is suspended or dissolved in the plant effluent.

Waste Generated (Raw Waste)

The amount (usually expressed as weight) of some residual substance generated by a plant process or the plant as a whole. This quantity is measured before treatment.

Water Recirculation or Recycling

The volume of water already used for some purpose in the plant which is returned with or without treatment to be used again in the same or another process.

Water Use

The total volume of water applied to various uses in the plant. It is the sum of water recirculation and water withdrawal.

Water Withdrawal or Intake

The volume of fresh water removed from a surface or underground water source by plant facilities or obtained from some source external to the plant. The effluent limitations guidelines for sodium dichromate and byproduct sodium sulfate plants, based on the application of the best available technology economically achievable, require no discharge of process waste water pollutants to navigable waters. 9992;G

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No. 75-978

In the Supreme Court of the United States

OCTOBER TERM, 1975

E. I. DU PONT DE NEMOURS AND COMPANY, ET AL., PETITIONERS

v.

RUSSELL E. TRAIN, ADMINISTRATOR OF THE ENVIRONMENTAL PROTECTION AGENCY, ET AL.

ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

MEMORANDUM FOR THE RESPONDENTS

ROBERT H. BORK,
Solicitor General,
Department of Justice,
Washington, D.C. 20530.

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MEMORANDUM FOR THE RESPONDENTS

Respondents agree that the Court should grant the petition for a writ of certiorari in this case.

1. This case began when petitioners, who are eight chemical manufacturers,[1] sued in the United States District Court for the Western District of Virginia, challenging regulations promulgated by the Administrator of the Environmental Protection Agency (EPA). The chal-

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[1] E. I. du Pont de Nemours and Company, Olin Corporation, FMC Corporation, American Cyanamid Company, Monsanto Company, the Dow Chemical Company, Allied Chemical Corporation, and Hercules Incorporated.

lenged regulations,[2] issued on March 12, 1974, under the Federal Water Pollution Control Act as amended in 1972, 86 Stat. 47, 33 U.S.C. (Supp. IV) 1251, *et seq.*, related to effluent discharges from plants manufacturing sulfuric acid.

Petitioners claimed that the regulations were invalid because they did not constitute effluent limitation guidelines[3] under Section 304(b) of the Act (33 U.S.C. (Supp. IV) 1314(b)),[4] but were instead effluent limitations. Petitioners further contended that the EPA Administrator had no authority to promulgate effluent limitations, that Section 301(b) (33 U.S.C. (Supp. IV) 1311(b)) gave him no authority to set uniform national effluent limitations, and that such limitations must be prescribed on a plant-by-plant basis in the discharge permits issued by the State (or the EPA regional office) under Section 402 of the Act (33 U.S.C. (Supp. IV) 1342).[5]

In light of their interpretation of the Act, petitioners argued that the proper forum for initial review of the

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[2]40 C.F.R. Part 415 (Inorganic Chemicals Manufacturing Point Source Category) is set out in pertinent part at Pet. App. 1-d to 37-d. See also Pet. App. 6-b to 7-b.

[3]Petitioners also contended that there was no adequate evidence in the record to support the regulations.

[4]Section 304(b) is set out at Pet. App. 7-c to 9-c.

[5]In short, as the district court stated (Pet. App. 7-b), petitioners "contend that the word 'guidelines' in Section 304(b) is a term of art which contemplates the administrative promulgation of broadly outlined regulations to serve as a starting point for the development of specific restrictions which would then be individualized for each discharger by way of permits issued by the Regional Administrator or State pursuant to Section 402, with such permits embodying the 'limitations' to be 'achieved' pursuant to [Section] 301."

regulations was the district court, not the court of appeals, since Section 509(b) of the Act (33 U.S.C. (Supp. IV) 1369 (b)) conferred exclusive jurisdiction upon the courts of appeals to review only the Administrator's action under Sections 301, 302, 306, 307 and 402 of the Act (see Pet. App. 8-b to 9-b). The EPA Administrator, disagreeing with petitioners' interpretation, contended that only the court of appeals had jurisdiction because his action in promulgating the challenged regulations was properly based, in part, upon Section 301(b) of the Act.

The district court granted the Administrator's motion to dismiss for lack of jurisdiction. It held that the Act authorized EPA to promulgate effluent limitations under Section 301(b), that the regulations in question were in fact promulgated pursuant to Section 301(b), and that exclusive jurisdiction to review such regulations is vested in the courts of appeals by Section 509(b)(1)(E) of the Act, 33 U.S.C. (Supp. IV) 1369(b)(1)(E). Because of the interrelationship between Section 301 effluent limitations and Section 304 guidelines, the court further stated that petitioners' attack on the Section 304(b) guidelines was "in essence a challenge to the Administrator's action in promulgating effluent limitations under Section 301 and must be pursued under Section 509(b)(1)(E) in the Court of Appeals" (Pet. App. 16-b).

Petitioners' appeal to the Fourth Circuit (hereinafter "*du Pont I*") was consolidated for briefing and argument with protective petitions for review that had also been filed in the court of appeals, pursuant to Section 509(b)(1)(E), by petitioners and by six additional chemical manufacturers not parties to the district court action (hereinafter, "*du Pont II*"). The petitions for review challenged the same sulfuric acid regulations that were involved in the district court action, as well as similar

regulations applicable to ten other inorganic chemical products.

On December 30, 1975, the court of appeals affirmed the district court's dismissal of *du Pont I* for lack of jurisdiction (Pet. App. 1-a to 12-a). Unlike the district court, the court of appeals viewed the jurisdictional question and the question of the EPA Administrator's authority to issue the regulations under Section 301(b), as separate and distinct. The court of appeals held that it need not decide the question of the Administrator's statutory authority in order to decide the jurisdictional question (Pet. App. 9-a). It reasoned that even if petitioners were correct in their view that the Administrator may not promulgate effluent limitations under Section 301 (b), the guidelines he concededly must promulgate under Section 304(b) are a necessary key to the attainment of the goals set forth in Section 301. Thus, the court held that "any action taken by the Administrator under [Section] 304(b) should properly be considered to be pursuant to the provisions of [Section] 301 and, therefore, reviewable by this court under [Section] 509" (Pet. App. 11-a).

After the filing of the instant petition for a writ of certiorari, the court of appeals, on March 10, 1976, decided the merits of the proceedings in *du Pont II* before it under Section 509(b)(1)(E).[6] (A copy of this decision is being lodged herewith.)

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[6]In *du Pont II*, the court sustained the general validity of the regulations. It held that regulations controlling effluents may be issued by the Administrator under a combination of the authority conferred in Sections 301 and 304. In the interests of national uniformity, such regulations are presumptively valid, but they must provide a procedure for permitting individual variances, modifications and exceptions for both existing plants and new sources. In regard to the particular regulations applicable to more than one sub-category of effluent, the court set aside portions of the regulations dealing with "process waste water" and "process waste water pollutants," and with "catastrophic rainfall." The court also set aside portions of particular regulations dealing with eleven chemical products.

2. As petitioners point out (Pet. 15-21), the questions presented here have been considered by five courts of appeals, including the court below. Although their reasoning differs, three circuits are in agreement with the decision here that the courts of appeals have exclusive jurisdiction to review the Administrator's regulations governing effluent discharges from existing plants. *American Meat Institute* v. *Environmental Protection Agency*, 526 F.2d 442 (C.A. 7); *American Petroleum Institute* v. *Train*, 526 F.2d 1343 (C.A. 10); *American Iron and Steel Institute* v. *Environmental Protection Agency*, 526 F.2d 1027 (C.A. 3) (by implication). One court of appeals has reached the opposite conclusion. *CPC International, Inc.* v. *Train*, 515 F.2d 1032 (C.A. 8).

There is thus a conflict among the circuits on important questions under the Federal Water Pollution Control Act Amendments, which may involve not only the jurisdictional issues, but also issues concerning the Administrator's authority to promulgate uniform national effluent limitations under Section 301(b) of the Act. Whether the Administrator has such authority, which is the second question presented in the petition, was not decided by the court below in this case because of its conclusion that even if the Administrator could not act under Section 301(b), the court of appeals nevertheless had exclusive jurisdiction to review the regulations.[7] Since we agree with this approach to the jurisdictional

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[7]As we noted above, in *du Pont II* the court reached this issue and determined that the Administrator had authority under Section 301(b).

issue, we believe that this Court need not decide the question concerning the Administrator's authority. Nevertheless, this question, as well as the first and third raised in the petition, is properly presented since petitioners have contended throughout that in order to decide whether the court of appeals has exclusive jurisdiction under Section 509, it must first determine whether the Administrator had authority under Section 301, which petitioners claim he did not.

ROBERT H. BORK,
Solicitor General.

APRIL 1976.

DOJ-1976-04

In the Supreme Court of the United States

OCTOBER TERM, 1976

No. 75-978

E. I. du Pont de Nemours and Company, et al.,
Petitioners,

v.

Russell E. Train, as Administrator,
Environmental Protection Agency, et al.,
Respondents.

On Writ Of Certiorari To The United States Court Of Appeals For The Fourth Circuit

BRIEF FOR PETITIONERS

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JULY 16, 1976

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BRIEF FOR PETITIONERS[1]

Opinions Below

The opinion of the court of appeals (App. 240; Pet. in No. 75-978, Appendix A)[2] is reported at 528 F.2d 1136. The opinion and order of the district court (App. 219; Pet. in No. 75-978, Appendix B) is reported at 383 F. Supp. 1244.

[1] Petitioners in No. 75-978 are E. I. du Pont de Nemours and Company, Olin Corporation, FMC Corporation, American Cyanamid Company, Monsanto Company, The Dow Chemical Company, Allied Chemical Corporation, and Hercules Incorporated.

[2] Throughout this brief, citations to the Single Appendix will be designated "App. —." An exhibit volume of the Appendix has also been prepared comprising a reproduction of two lengthy EPA-issued documents which are part of the administrative record in this case. This exhibit volume will be cited as "Ex. R. —." In addition, in this brief citation will be made to certain portions of the original record on file with the Court which have not been reproduced in the Appendix. Where those portions of the record stem from the certified index of the administrative record filed by EPA with the court of appeals, the citation will appear as "R. —." Such citations will reflect EPA's original pagination of the administrative record. This pagination by EPA of the administrative record was also used throughout the proceedings in the court of appeals. A complete copy of the administrative record is on file with the Clerk of this Court.

The decision by the court of appeals was the first opinion by that court in a consolidated proceeding. The second opinion of the court of appeals (App. 253; Pet. in No. 75-1473, Appendix A) has not yet been officially reported. It is unofficially reported at 8 E.R.C. 1718. The second decision is the subject of writs of certiorari numbered 75-1473 and 75-1705.[3]

Jurisdiction

The first judgment of the court of appeals (App. 252; Pet. in No. 75-978, Appendix A at 13a) was entered on December 30, 1975. The petition for writ of certiorari in No. 75-978 was filed on January 12, 1976, and was granted by this Court on April 19, 1976.

The second judgment of the court of appeals (App. 287-289; Pet. in No. 75-1473, Appendix A at 35a to 37a) was entered on March 10, 1976. On April 13, 1976, the petition for writ of certiorari in No. 75-1473 was filed respecting the second decision; this petition was granted by this Court on June 21, 1976. A cross-petition for writ of certiorari (No. 75-1705) was filed on May 24, 1976, and was also granted by this Court on June 21, 1976.

On June 21, 1976, this Court denied petitioners' motion to consolidate the cases numbered 75-1473 and 75-1705 with No. 75-978. The Court did consolidate Nos. 75-1473 and 75-1705, and ordered those cases to be argued "in tandem with No. 75-978", the present case.

Simultaneously with the filing of this brief, petitioners are filing the opening brief in Nos. 75-1473 and 75-1705.

The jurisdiction of this Court rests on 28 U.S.C. § 1254(1).

[3] Petitioners in No. 75-1473 and Cross-Respondents in No. 75-1705 are the eight companies listed *supra*, at 1 n. 1, plus Union Carbide Corporation, Stauffer Chemical Company, Diamond Shamrock Corporation, PPG Industries, Incorporated, BASF Wyandotte Corporation, Cities Service Company, and N L Industries, Incorporated.

Questions Presented[4]

1. Whether the Federal Water Pollution Control Act, as amended, provides that regulations governing wastewater effluent discharges from existing plants be issued in the form of

(a) "effluent limitations" based upon an authorization said to be implied from Section 301(b) of the Act, or

(b) "guidelines for effluent limitations" in compliance with the express command of Section 304(b) of the Act.

2. Whether district courts or courts of appeals have initial jurisdiction to review regulations issued by the Administrator of the Environmental Protection Agency under the Federal Water Pollution Control Act, as amended, governing wastewater effluent discharges from existing plants.

3. Whether when "the Act is not clear" in conferring initial jurisdiction to review regulations for existing plants upon the courts of appeals rather than in providing the normal review in the district courts, the statute should be construed on grounds of practicality to confer such initial jurisdiction on the court of appeals.

Statutes And Regulations Involved

1. *The Federal Water Pollution Control Act, as amended.* Sections 101, 301, 302, 304, 306, 307, 309, 401, 402, 502, 505 and 509 of the Act (33 U.S.C. §§ 1251, 1311, 1312, 1314, 1316, 1317, 1319, 1341, 1342, 1362, 1365 and 1369) are set forth in Appendix A to this brief, *infra* (separately bound), at 1a–42a.

2. *"Effluent Limitations Guidelines" and "Standards Of Performance For New Sources" for the Inorganic Chemicals Manufacturing Point Source Category.* The regulations issued by the

[4] The same questions are presented to this Court in both Nos. 75-978 and 75-1473.

The cross-petition in No. 75-1705 presents the further question whether standards of performance promulgated under Section 306 of the Act to control effluent discharges from sources constructed after the publication of proposed standards ("new sources") are "presumptively applicable" to rather than always binding on such sources, such that the Agency must provide a "safety valve procedure" enabling individual new sources to obtain limitations in a permit different from the standards upon an appropriate factual showing.

Administrator which govern the wastewater effluent discharges from existing plants and from new sources in the Inorganic Chemicals Manufacturing Point Source Category are found at 40 C.F.R. Part 415, *added by* 39 *Fed. Reg.* 9611-9635 (March 12, 1974). They are set forth in Appendix B to this brief, *infra,* at 1b–79b.

3. *"Effluent Guidelines and Standards—General Provisions".* The regulations issued by the Administrator to provide general provisions applicable to effluent guidelines for existing sources and to standards of performance for new sources for the various industry categories including the inorganic chemicals category are found at 40 C.F.R. Part 401, *added by* 39 *Fed. Reg.* 4531-4533 (February 4, 1974). They are set forth in Appendix C to this brief, *infra,* at 1c–9c.

STATEMENT OF THE CASE

This case and the related cases (Nos. 75-1473 and 75-1705) specifically involve the Environmental Protection Agency's regulations and standards for wastewater effluents from facilities in the inorganic chemicals industry.[5] They present issues of the proper construction to be accorded key sections of the Federal Water Pollution Control Act, as amended ("the Act"), 33 U.S.C. §§ 1251 *et seq.* The substantive issues concern both the effluent regulations for existing plants and the effluent standards for new sources. The questions respecting the existing plant regulations in this case and in No. 75-1473 are wide-ranging: at issue is the nature of the statutory authority granted by Congress to the Administrator of the Environmental Protection Agency ("EPA" or "Administrator" or "the Agency") to issue regulations governing wastewater effluent discharges from existing industrial plants and other existing facilities. For the new source standards, No. 75-1705 presents the much more limited issue of whether such standards should have built into

[5] These proceedings relate only to the effluent regulations applicable to "discharge of a pollutant" from "point sources." See § 502(11), (14) and (16), 33 U.S.C. § 1362(11), (14) and (16). Other sections of the statute and of the regulations deal with standards applicable to pretreatment of wastewater before it may be discharged to a publicly owned treatment system (*e.g.*, that of a municipality). (§ 307(b), (c), 33 U.S.C. § 1317(b), (c).)

them a modest "safety valve" to account for unanticipated factual situations.

Intertwined with the substantive issues for existing plants is the jurisdictional question of whether actions to review EPA's effluent regulations for existing plants should be brought as an initial matter in the district courts or whether they should be brought in the courts of appeals.[6] No jurisdictional issue arises in conjunction with review of the new source standards.

Resolution of both the statutory and the jurisdictional questions in these cases depends upon the detailed provisions of the Federal Water Pollution Control Act, as amended, upon the legislative history underlying the 1972 Amendments which rewrote the Act, and upon the course of EPA's rulemaking efforts to establish effluent regulations for existing and for new inorganic chemical plants purportedly in satisfaction of key provisions of the Act.

A. The Statutory Framework

In October 1972, Congress enacted the Federal Water Pollution Control Act Amendments of 1972 (Pub. L. 92-500, 86 Stat. 816). These Amendments constituted a basic and extensive revision of the Federal Water Pollution Control Act.

As thus amended, the Act constitutes the organic statute under which all effluent discharges from industrial plants and municipalities are regulated.

[6] The jurisdictional question presents no bar to the Court's consideration of the substantive statutory-construction issues relating to the nature of the regulations for existing plants. These related cases reflect the alternative jurisdictional predicates. No. 75-978 arises on an action begun initially in district court. Nos. 75-1473 and 75-1705 stem from a consolidated series of actions filed originally in the court of appeals. The statutory-construction issues were raised in both sets of proceedings. Moreover, the Court must necessarily consider and resolve the statutory issues to decide whether initial jurisdiction of an action to review EPA's existing source regulations lies in the district courts or in the courts of appeals. See *Federal Communications Commission* v. *Columbia Broadcasting System of California, Inc.*, 311 U.S. 132 (1940); *Cheng Fan Kwok* v. *Immigration and Naturalization Service*, 392 U.S. 206 (1968); cf. *National Railroad Passenger Corp.* v. *National Ass'n of Railroad Passengers*, 414 U.S. 453, 456 (1974); *Montana-Dakota Utilities Co.* v. *Northwestern Public Service Co.*, 341 U.S. 246 (1951); *Bell* v. *Hood*, 327 U.S. 678 (1946).

1. *A general prohibition with specific permits.*

The structure of the Act is based on a general prohibition of discharges except as they are permitted under the law. (§ 301 (a), 33 U.S.C. § 1311(a).) Permits for effluent discharges are issued under Section 402 of the Act, 33 U.S.C. § 1342, and the limits and conditions which restrict the discharge of an individual industrial plant are fixed in the permit after proceedings conducted under Section 402.[7] Unless a plant has a permit, no effluent discharges are lawful.[8]

The permit procedure is based on the congressional policy that the primary responsibility for water quality protection shall rest with the States. (§ 101(b), 33 U.S.C. § 1251(b).) When a State's permit program meets the requirements of the Act, as determined by the Administrator, the statute provides that the permit granting authority automatically passes to the State from EPA. See § 402(b)–(f), 33 U.S.C. § 1342(b)–(f); *Environmental Protection Agency* v. *California*, __U.S.__, 44 U.S.L.W. 4781, 4782-4783 (U.S., June 7, 1976). As of July 1, 1976, twenty-seven (27) States had qualified and now administer the permit program within their respective jurisdictions.[9] In the

[7] These are the effluent limitations defined by Section 502(11), 33 U.S.C. § 1362(11):

"(11) The term 'effluent limitation' means any restriction established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance."

[8] The statute provided, however, that prior to December 31, 1974, if a permit application was pending without dispositive action, effluent discharges from existing plants did not violate the Act. (§ 402(k), 33 U.S.C. § 1342(k).)

[9] These States are:

STATE	*DATE OF APPROVAL*	*FEDERAL REGISTER NOTICE OF APPROVAL*
California	May 14, 1973	39 *Fed. Reg.* 26061
Oregon	September 26, 1973	39 *Fed. Reg.* 26061
Connecticut	September 26, 1973	39 *Fed. Reg.* 26061
Michigan	October 17, 1973	39 *Fed. Reg.* 26061
Washington	November 14, 1973	39 *Fed. Reg.* 26061
Wisconsin	February 4, 1974	39 *Fed. Reg.* 26061
Ohio	March 11, 1974	39 *Fed. Reg.* 26061
Vermont	March 11, 1974	39 *Fed. Reg.* 26061

remaining States, where there is no approved State permit program, EPA administers a permit program of its own. (§ 402(a) (1), 33 U.S.C. § 1342(a)(1).)

The permit system for existing plants and for new sources relies on the same general procedures issued by the Administrator acting under Section 402. *Cf. Environmental Protection Agency* v. *California, supra,* 44 U.S.L.W. at 4787 n.37. The permit system in practice operates somewhat differently, however, depending upon whether an existing or a new source is involved.

2. *"New source" permits.*

For new plants the administrative permit proceedings focus on EPA's "standards of performance" for new sources issued under Section 306, 33 U.S.C. § 1316.[10] These standards are applied in conjunction with an evaluation of the projected plant

STATE	*DATE OF APPROVAL*	*FEDERAL REGISTER NOTICE OF APPROVAL*
Delaware	April 1, 1974	39 *Fed. Reg.* 26061
Mississippi	May 1, 1974	39 *Fed. Reg.* 26061
Montana	June 10, 1974	39 *Fed. Reg.* 26061
Nebraska	June 12, 1974	39 *Fed. Reg.* 26061
Georgia	June 28, 1974	39 *Fed. Reg.* 26061
Kansas	June 28, 1974	39 *Fed. Reg.* 26061
Minnesota	June 30, 1974	39 *Fed. Reg.* 26061
Maryland	September 5, 1974	39 *Fed. Reg.* 34601
Missouri	October 31, 1974	39 *Fed. Reg.* 40067
Hawaii	November 29, 1974	39 *Fed. Reg.* 43759
Indiana	January 2, 1975	40 *Fed. Reg.* 4033
Wyoming	January 31, 1975	40 *Fed. Reg.* 13026
Colorado	March 28, 1975	40 *Fed. Reg.* 16713
Virginia	April 1, 1975	40 *Fed. Reg.* 20129
South Carolina	June 11, 1975	40 *Fed. Reg.* 28130
North Dakota	June 14, 1975	40 *Fed. Reg.* 28663
Nevada	September 20, 1975	40 *Fed. Reg.* 48389
North Carolina	October 20, 1975	40 *Fed. Reg.* 51493
New York	October 29, 1975	40 *Fed. Reg.* 54462

[10] If such standards are not in existence or have not been proposed, then a new plant is not a "new source" subject to the special requirements of Section 306. See § 306(a)(2). Any new plant which is not a "new source" would be regulated under the provisions for existing sources ("point sources"). See §§ 301(a) and (b), 304(b), 402(a), and 502(12) and (14).

made in an environmental assessment, or alternatively, an environmental impact statement. EPA's action in issuing a permit for any discharge from a new source is arguably subject to the provisions of the National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321 *et seq.*, ("NEPA") including Section 102(2)(C) of NEPA respecting the preparation of environmental impact statements in certain cases.[11] To provide time to fulfil the Section 306 and the NEPA requirements for a new source permit, EPA has by notice in the *Federal Register* stated that potential permit applicants for a new source discharge should submit a request to the Agency for a "preapplication conference", and that such a request be filed at least 24 months prior to initiation of the discharge. (39 *Fed. Reg.* 35202 (Sept. 30, 1974).)

Substantively, the Section 306 standards are to require application of the "best available demonstrated control technology." (§ 306(a)(1), 33 U.S.C. § 1316(a)(1).) For 27 statutorily specified industrial categories, EPA was to propose new source standards within one year and ninety days after enactment of the 1972 Amendments. (§ 306(b)(1)(A), (B).) "[I]norganic chemicals manufacturing" was one of the 27 specified categories. (§ 306(b)(1)(A).) Final standards were to be promulgated 120 days later. (§ 306(b)(1)(B).) In issuing the standards, the Act provides that "[t]he Administrator may distinguish among classes, types, and sizes within categories of new sources for the purpose of establishing such standards and shall consider the type of process employed (including whether batch or continuous)." (§ 306(b)(2).)

Several enforcement routes are provided. Taken together, Sections 306(e), 309 and 505 provide that it is unlawful for a

[11] Section 511(c)(1), 33 U.S.C. § 1371(c)(1), provides that *none* of the actions taken by the Administrator pursuant to the Federal Water Pollution Control Act "shall be deemed a major Federal action significantly affecting the quality of the human environment within the meaning of [NEPA]", with two exceptions. One of those exceptions is "the issuance of a permit under Section 402 of this Act for the discharge of any pollutant by a new source as defined in Section 306 of this Act . . . ." § 511(c)(1), 33 U.S.C. § 1371(c)(1). Permits issued for a new source by a State are not subject to NEPA's requirements. See the companion opening brief in Nos. 75-1473 and 75-1705, at 9 n.9.

new source to be operated in violation of a new source standard,[12] and that such a violation is subject to enforcement action by EPA as well as to citizen suits.[13] However, Section 402(k), 33 U.S.C. § 1342(k), provides that compliance with a permit "shall be deemed compliance, for purposes of Sections 309 and 505, with sections . . . 306 . . . [etc.]." Thus, a permit issued for a new source by a State or by EPA under Section 402 can contain "effluent limitations" which implement Section 306 but which are different from and which override the requirements of a new source standard issued under Section 306. In effect, the Act provides that in the absence of a permit the new source standard is applicable directly. But it also provides that permit proceedings can generate limitations different from an otherwise applicable new source standard, where a factual predicate for such limitations is established in the permit proceedings including the NEPA review process.

3. *Existing source permits.*

For existing plants, the permit process is more complex. Here, the Act does not specify the issuance of effluent standards. Rather, the basic regulatory framework in which the permit system operates is provided by regulations setting out the technology-based guidelines for effluent limitations under Section 304(b) of the Act, 33 U.S.C. § 1314(b). And, these guideline regulations are to reflect a two-phase implementation of treatment technology.

The purpose of these guideline regulations is provided by Section 301, 33 U.S.C. § 1311. Subsection (b) of Section 301 has two important attributes. It sets out in technological terms

[12] Section 306(e) provides:

"After the effective date of standards of performance promulgated under this section, it shall be unlawful for any owner or operator of any new source to operate such source in violation of any standard of performance applicable to such source."

[13] Section 309 authorizes EPA to take certain enforcement actions. Section 505 authorizes citizen suits.

the objective to be "achieved" by existing plants on a stringent time schedule:

(1) By July 1, 1977, effluent limitations shall be achieved which require application of the "best practicable control technology currently available".

(2) By July 1, 1983, and thereafter, the level to be attained is "best available technology economically achievable" (including elimination of discharges when it becomes "technologically and economically achievable").

In addition, Section 301 provides that these technological objectives shall be defined and determined in accordance with regulations under Section 304(b). (§ 301(b)(1)(A) and (b)(2)(A).)[14]

The regulations under Section 304(b), therefore, become the key to the achievement of both the 1977 and the 1983 objectives. Section 304(b) requires issuance by regulation of "*guidelines* for setting effluent limitations reflecting the mandate of section 301, which will be imposed as conditions of permits issued under section 402."[15]

[14] The statute uses the term "defined" in Section 301(b)(1)(A) in providing for achievement of the 1977 objectives, and the term "determined" in Section 301(b)(2)(A) in providing for achievement of the 1983 objectives.

[15] S. Rep. 92-414, 92d Cong., 1st Sess., at 51 (1971), reproduced in Congressional Research Service of the Library of Congress, A *Legislative History of the Water Pollution Control Act Amendments of 1972*, at 1469 (1973) (hereafter "Leg. Hist.") (emphasis added). This regulatory pattern in the statute is confirmed by the legislative history of the Act. See *infra*, at 43-63. For example, the Senate Report quoted above stated:

> "*Subsection (b) of this section* [*Section 304*] *requires the Administrator, within one year after enactment, to publish guidelines for setting effluent limitations reflecting the mandate of section 301, which will be imposed as conditions of permits issued under section 402.* These guidelines would identify what constituted the 'best practicable control technology currently available' and the 'best available control measures and practices', and the degree of effluent reduction attainable through the application of each. Thus, these guidelines would define the effluent limitations required by the first and second phases of the program established under section 301. In addition, the Administrator would identify control measures and practices available to eliminate the discharge of pollutants from any category of point sources, to allow the full implementation of the objectives of the Act." (*Id.* (emphasis added).)

Congress spelled out this portion of the statutory plan. It incorporated a direct command in Section 304(b) that the Administrator "shall" within one year promulgate regulations "providing guidelines for effluent limitations . . . ." (§ 304(b).) The statutory role assigned to guideline regulations under Section 304(b) is further demonstrated by Congress' specific requirement that they have two essential elements. *First*, the regulations "shall" identify the degree of effluent reduction attainable by 1977 through the application of "best practicable control technology currently available" for classes and categories of point sources. (§ 304(b)(1)(A).) *Second*, the statute directs that the regulations "shall . . . specify factors to be taken into account in determining the control measures and practices to be applicable to point sources . . . within such categories or classes." (§ 304(b)(1)(B).)[16]

Congress accorded this crucial role to guidelines issued under Section 304(b) to create a regulatory mechanism to cope with the plants already in place and operating. Congress recognized the large number of existing industrial plants which are sources of water pollution; it provided a means whereby the enormous diversity of these plants and their products and processes would have to be taken into account in the permit program.[17]

To this end, Congress explicitly set out in Section 304(b) the factors which EPA was to specify and elaborate with further

[16] The comparable provisions pertaining to the 1983 guideline regulations are contained in Section 304(b)(2)(A) and (B).

[17] EPA's statement in the introduction to the regulations (speaking of the 1977 guidelines) describes the interrelationship between the uniform technological objectives set out in Section 301 and the guideline regulations under Section 304(b) as follows:

> "Section 304(b)(1)(B) of the Act provides for 'guidelines' to implement the uniform national standards of section 301(b)(1)(A). Thus Congress recognized that some flexibility was necessary in order to take into account the complexity of the industrial world with respect to the practicability of pollution control technology." (Appendix B, *infra*, at 17b.)

In contrast, for new plants Congress directed the Administrator to issue "Federal *standards* of performance for new sources" within the industry categories, and not guidelines. (§ 306(b)(1)(B), 33 U.S.C. § 1316(b)(1)(B) (emphasis added).) The standards would apply absent special circumstances. See the companion opening brief in Nos. 75-1473 and 75-1705, at 5-11.

precision in the regulations.[18] Thus, the statutory provisions mandating the content of the Section 304(b) regulations make it plain that the guidelines are not merely to identify the degree of pollution reduction attainable with the "best practicable" (1977) and "best available" (1983) technology. The guidelines are also to provide the permit issuing authorities with EPA's elucidation, and elaboration in the context of the industry category involved, of the factors to be taken into account in actually applying the guidelines to a particular plant. Thus formulated, the guidelines will perform their intended function in a permit proceeding.

To assure that the guideline regulations were available promptly to permit-issuing authorities and to affected parties, Congress explicitly mandated that they be "publish[ed] within one year of enactment" of the 1972 Amendments. (§ 304(b).) Congress thus provided that the guideline regulations had to be issued roughly 7 months before the new source standards for the same industry had to be issued. (Compare § 304(b) with § 306(b)(1)(A) and (B). See *supra*, at 8, 11.)

4. *Administrative and judicial review of permits and regulations.*

The guideline regulations have a role beyond the initial permit proceedings for a particular plant. Where States and not EPA have the permit-issuing authority, the Act provides that

[18] For example, for the 1977 guideline regulations, Congress mandated that the Administrator's regulations "shall" specify and elaborate the following factors:

> "*Factors* relating to the assessment of best practicable control technology currently available to comply with subsection (b)(1) of section 301 of this Act *shall include consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved* from such application, and shall also take into account *the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, nonwater quality environmental impact* (including energy requirements), and such other factors as the Administrator deems appropriate . . . ." (§ 304(b)(1)(B) (emphasis added).)

The comparable identification of factors to be specified for the 1983 guideline regulations is in Section 304(b)(2)(B).

the State shall transmit to the Administrator for his review any permit which it proposes to issue. (§ 402(d)(1), 33 U.S.C. § 1342(d)(1).) The Administrator can block issuance of the permit by the State if within 90 days he "objects in writing to the issuance of such permit as being outside the guidelines and requirements of this Act." (§ 402(d)(2), 33 U.S.C. § 1342 (d)(2).)[19]

Section 509 of the Act, 33 U.S.C. § 1369, provides for a method of judicial review of specified actions of EPA which is different from the normal review procedure in district courts under the Administrative Procedure Act. Section 509 provides that a special review by petition in the courts of appeals shall apply to an expressly specified group of actions by the Administrator, *i.e.*, certain actions under Sections 301, 302, 306 and 307, as well as certain actions taken respecting permits under Section 402. Regulations under Section 304(b) are *not* mentioned in Section 509. Issuance of new source standards under Section 306 is identified in Section 509.

B. Administrative Proceedings

1. *The initial "guidance" documents—a model for guideline regulations.*

The 1972 Amendments became law on October 18, 1972. EPA was faced with the immediate task of issuing guideline regulations within one year and of issuing new source standards within one year and 210 days. Since these regulations covered a full range of industrial, agricultural, and municipal treatment systems, and other facilities, the EPA's responsibility was enormous. Congress had mandated the time schedule for promulgating guideline regulations, however, with the knowledge that EPA already had commissioned various industry studies by a

[19] Since a new source standard is a "requirement" of the Act (see *supra*, at 7-9), the Administrator can also block issuance of a permit for a new source if he finds that the effluent limitations in the permit do not accord with an applicable new source standard.

number of outside contractors.[20] The Agency had plans to use these industry studies as the basis for "guidance" documents to be used with the Refuse Act Permit Program.[21]

The private contractor retained by EPA to prepare a technical report on the inorganic chemicals industry was General Technologies Corp. ("General Technologies"). General Technologies submitted its report in mid-July 1971. (R. 3183-3325.) By October 30, 1972, EPA had prepared a document it called "Effluent Limitations Guidance For The Refuse Act Permit Program, Inorganic Chemicals Industry." (App. 8-20, R. 2550-2567.) EPA said this "guidance" document set out the effluent discharge values obtainable after application of "best practicable control technology currently available" (App. 8, R. 2551), *i.e.*, it reflected the "1977 step" to be achieved by existing plants, as provided in the bills then pending before Congress to amend the Act. The values in the guidance document were set forth in terms of a range. "Schedule B" to the document represented "the most lenient acceptable effluent levels" and was intended as a base level since "[n]o plant should achieve less pollution reduction than Schedule B values." (App. 9, R. 2552.) A more stringent "Schedule A" was intended for plants beginning abatement programs. (App. 8, R. 2551.) Specific "Effluent Guide-

[20] The study of industrial wastewater technology began in 1971. EPA called this study the "Industrial Waste Studies Program." (See EPA's February 4, 1972, Summary Report on the Inorganic Chemicals Industry, R. 2708.) During the hearings on the bill which ultimately became the 1972 Amendments to the Act, EPA described the program as encompassing "program studies" of each of 20 separate industrial categories, including inorganic chemicals. See *infra*, at 15 n. 23, and 44-49. (R. 2708 refers to 21 such studies.)

[21] The Refuse Act Permit Program was premised on Section 13 of the Rivers and Harbors Act of 1899, 33 U.S.C. § 407, and had been established pursuant to a Presidential Executive Order. (See Executive Order 11574, 35 *Fed. Reg.* 19627 (Dec. 25, 1970).) It was implemented by the Corps of Engineers, acting in conjunction with EPA. (*Id.*) That program provided the impetus for, and was superseded by, the new permit program authorized by Section 402 of the Act. See *Environmental Protection Agency* v. *California*, __U.S.__, 44 U.S.L.W. 4781, 4782 n.14 (U.S., June 7, 1976); *United States* v. *Pennsylvania Industrial Chemical Corp.*, 411 U.S. 655, 657 n.2, 659 n.9 (1973).

lines" for manufacture of 10 chemical products were set out. (App. 19-20, R. 2566-2567.)[22]

The EPA guidance documents were not formally published by the Agency as rules, but the guidance documents were available to EPA's regional offices, to the petitioner companies, and to others.[23] The companies submitted comments to EPA on the guidance documents during the period of June 1972 through November 1972. (R. 2719, 2716, 2589, 2601, 2618, 2627.) On November 16, 1972, a meeting was held of company representatives and of officials from EPA's Office of Refuse Act Permit Program. (R. 2639.) In part, the meeting focussed on the enactment of the 1972 Amendments (October 18, 1972), and the circumstance that the guidance documents would now have to be formally promulgated as regulations. (R. 2640-2641.)

2. *EPA decides to combine rulemaking for guidelines and new source standards.*

On August 6, 1973, approximately ten months after enactment of the 1972 Amendments, EPA published in the *Federal Register* a notice setting out, among other things, its procedures for adopting guideline regulations under Section 304(b) and new source standards under Section 306:

> "Advance notice is hereby given concerning notices of proposed rule making to be published by the Environmental Protection Agency ('EPA') with respect to effluent limitations guidelines, standards of performance, and pretreatment standards for new sources pursuant to sections 304(b), 306 and 307(c) of the Federal Water Pollution Control Act, as amended (33 U.S.C. §§ 1251, 1314, 1316 and 1317(c); 86 Stat. 816 et seq.; Pub. L. 92-500)

[22] The guidance document did not set out the factors which were to be applied by the permit officers in selecting the appropriate limitations in a permit. Rather, it contemplated that a technical briefing would be given by EPA for that purpose. (App. 8-9, R. 2551.)

[23] EPA announced that effluent guides for 20 industry categories would be distributed to EPA regional offices in October 1971 and would be made available to the public in November 1971. See BNA, *Environment Reporter*, Current Developments, at 570 (September 17, 1971).

('the Act'). *The purpose of this notice is to facilitate public comment upon the regulations to be promulgated under sections 304(b), 306 and 307(c), both before and after the publication of the notices of proposed rule making.* In addition, this notice will explain EPA's overall plans for development of effluent limitations guidelines and standards of performance for new sources and the approach which is being taken by the Agency in discharging the duties placed upon the Administrator under sections 304 (b), 306 and 307(c) of the Act.

"EPA believes that the exposure of the technical basis and reasoning underlying regulations to be established pursuant to sections 304(b), 306 and 307(c) is essential to the promulgation of sound effluent limitations guidelines and standards of performance for new sources." (38 *Fed. Reg.* 21202 (August 6, 1973), App. 21, R. 4330 (emphasis added).) [24]

Also in the August 1973 notice, EPA announced that it had initiated new technical studies by independent contractors "of some thirty [separate] point source [industrial] categories for which regulations will initially be promulgated . . . ." (38 *Fed. Reg.* at 21203, App. 25, R. 4331.) Among the industrial categories was "[No.] 15. Inorganic Chemicals Manufacturing." (*Id.*, App. 27.) EPA said it would make the contractor's technical reports available for review by interested persons, prior to the time it actually proposed any regulations for an industry. (*Id.* at 21205-21206, App. 37-38, R. 4333-4334.)

EPA's contractor for the inorganic chemicals industry regulations was again General Technologies. (R. 6378-6430.) In June 1973, two months prior to the August 1973 notice, General Technologies' "Draft Contractor's Report" (App. 1-7, R. 1-451) had been made publicly available by EPA. That report set out technical wastewater and treatment information

[24] As noted *supra*, at 4 n.5, Section 307 provides for pretreatment standards for existing sources (subsection 307(b)), and for new sources (subsection 307(c)). The pretreatment standards issued for new sources by EPA under Section 307(c) are not involved in these cases. EPA has not yet issued pretreatment standards for existing sources for the inorganic chemicals industry.

for 22 separate products in the industry. In a preambular statement to the report, the Agency stated that "[t]he regulations to be published by EPA under Sections 304(b) and 306 of the Federal Water Pollution Control Act, as amended, will be based to a large extent on the report and the comments received on it." (App. 2, R. 2.)

The June 1973 contractor's report and the August 1973 *Federal Register* notice of rulemaking procedures put the petitioner companies on notice that EPA intended to rely on a combined rulemaking proceeding to set both guideline regulations under Section 304(b) and new source standards under Section 306. EPA took this decision despite the fact that the Agency had in hand in late 1972 "guidance" documents which could have provided the basis for rapid promulgation of 1977-step guideline regulations under Section 304(b). By thus combining the rulemaking, the Agency effectively negated the one-year promulgation deadline set out in Section 304(b) for the existing-plant guidelines.[25] Also, in the combined rulemaking, EPA's work respecting existing plants reached beyond the 1977-step guidelines, which were needed by permit authorities to establish the first round of permits, to include also the 1983-step guidelines.

The next step to carry out EPA's combined rulemaking scheme for the inorganic chemicals industry occurred in August 1973, when EPA made available an "Economic Analysis Of Proposed Effluent Guidelines—Inorganic Chem-

[25] When EPA did not promulgate effluent guideline regulations by October 18, 1973, the deadline specified in Section 304(b), the Natural Resources Defense Council, Inc. filed a complaint against the Administrator in the U.S. District Court for the District of Columbia, seeking a court-ordered schedule for issuance of such guideline regulations. On November 27, 1973, the district court entered an order finding that EPA had a "mandatory, non-discretionary duty to publish within one year of enactment of the Act final Section 304(b)(1)(A) effluent limitation guidelines . . . ." *Natural Resources Defense Council, Inc.* v. *Train*, 6 E.R.C. 1033 (D.D.C. 1973), *rev'd in part on other grounds and remanded*, 166 U.S. App. D.C. 312, 510 F.2d 692 (1975). The district court imposed a detailed "schedule" for promulgation of final guideline regulations (*id.* at 1034-1036), a schedule which has since been modified on a number of different occasions by the court. As of July 1, 1976, EPA had not yet issued guideline regulations for a number of industry subcategories.

icals, Alkali And Chlorine Industries (Major Products)". (App. 43-47, R. 4334-4454.) This report also was prepared under the Agency's supervision by an independent contractor. EPA's preface to the report said that the purpose of the economic study was

> "to analyze the economic impact which could result from the application of alternative effluent limitation guidelines and standards of performance to be established under sections 304(b) and 306 of the Federal Water Pollution Control Act, as amended." (App. 44, R. 4338.)

Interested parties, including the petitioning companies, submitted comments to the Agency on the economic report and on the General Technologies study. (*E.g.*, R. 4034-4328.) And by August 1973, EPA had reviewed and revised the General Technologies technical report and had issued its "Development Document for *Proposed Effluent Limitations Guidelines* and New Source Performance Standards for the Major Inorganic Products Segment of the Inorganic Chemicals Manufacturing Point Source Category". (App. 48, R. 4455 (emphasis added).) Then, on October 11, 1973, EPA published a notice of proposed rulemaking for "effluent limitations guidelines and standards of performance" applicable to the 22 separate product subcategories in the inorganic chemicals industry which had been the subject of the prior reports. (38 *Fed. Reg.* 28173-28194, App. 60-151, R. 4861-4882.) In the preamble to the proposed regulations the Agency stated that it relied upon the reports of General Technologies and of its economic contractor, the comments made on those reports by interested parties, and its own assessment of technical treatment information. (38 *Fed. Reg.* at 28175, App. 66, R. 4863.) For existing plants EPA said that "[t]he regulations proposed herein set forth effluent limitations guidelines, *pursuant to section 304(b) of the Act*, for [the 22 individual product subcategories], of the inorganic chemicals manufacturing category." (38 *Fed. Reg.* at 28174, App. 62, R. 4862 (emphasis added).) [26]

[26] The Notice also stated that the "regulations proposed herein set forth the standards of performance applicable to new sources for [the 22 product subcategories] of the inorganic chemicals manufacturing industry." (38 *Fed. Reg* at 28174, App. 63-64, R. 4862.)

In response to EPA's invitation, comments were submitted on the Agency's proposed guideline regulations for existing plants and proposed standards of performance for new sources. (App. 151-180, R. 4883-5353.)

3. *EPA announces a change in the legal basis for the existing-plant guideline regulations.*

In addition to the comments, in November 1973 an industry-association representative submitted a statement directly to the Administrator on the question whether the proposed guideline regulations met the requirements of Section 304(b). (App. 188, R. 6495.) As proposed, the guideline regulations did not contain ranges of effluent values, nor did they specify and elaborate factors as mandated by Section 304(b) to guide application of the numerical values to existing plants. In fact, the proposed guideline regulations did not look much different from the proposed new source standards. The statement remonstrated EPA for proposing regulations which took on the appearance of standards or fixed requirements, a characteristic which would cause difficulties in permit proceedings where the regulations would be applied to individual plants. (App. 189-190, R. 6496-6497.)

The response by Alan G. Kirk, II, then Assistant Administrator for Enforcement and General Counsel (App. 192-198, R. 6500-6504), demonstrated that the industry's concerns were legitimate. He said EPA's goal was to establish "nationally uniform standards" for existing plants as well as for new sources (App. 193, R. 6501), primarily because State permit and enforcement procedures would otherwise be too "lax" in some instances. (*Id.*) As then-Assistant Administrator Kirk put it: "For this reason, the guidelines must establish nationally uniform limitations to be implemented by the permit system rather than allowing individual determinations at the time of each permit application." (*Id.*, App. 194.)

Shortly thereafter, EPA issued general definitional regulations applicable to all the industry-category guidelines and

standards. (40 C.F.R. Part 401, *added by* 39 *Fed. Reg.* 4531-4533 (February 4, 1974), Appendix C to this brief, at 1c–9c.) Those general regulations contained a definition of "effluent limitations guidelines", a term not used in the Act:

> "(j) The term 'effluent limitations guidelines' means any effluent limitations guidelines issued by the Administrator *pursuant to section 304(b) of the Act.*" (40 C.F.R. § 401.11(j), Appendix C *infra*, at 5c (emphasis added).) [27]

At the end of February 1974, the Agency still had not finished its evaluation of the comments and issued its final regulations for the inorganic chemicals industry. However, EPA was moving even further from the statutory concept of issuing guidelines for existing plants under Section 304(b). In late February 1974 EPA gave notice that it was changing the asserted legal basis of the regulations for existing plants. On February 25, 1974, Alan G. Kirk, II, then Assistant Administrator for Enforcement and General Counsel, wrote in a widely publicized memorandum that "the effluent limitations guidelines which the Agency is presently issuing under Section 304(b) are also being issued [under] Section 301 and establish effluent limitations under Section 301." (Memorandum from Alan G. Kirk, II, to Acting Assistant Administrator for Air and Water Programs, at 2, February 25, 1974, reproduced in BNA *Environment Reporter*, Current Developments, at 1833-1834 (March 1, 1974).)

Assistant Administrator Kirk's Memorandum also contained a warning, *i.e.*, the Agency's new reliance on Section 301 as an authority for its regulations applicable to existing plants

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[27] The general provisions also defined "effluent limitation":

> "(i) The term 'effluent limitation' means any restriction established by the Administrator on quantities, rates, and concentrations of chemical, physical, biological and other constituents which are discharged from point sources, other than new sources, into navigable waters, the waters of the contiguous zone or the ocean." (40 C.F.R. § 401.11 (i), Appendix C *infra*, at 5c.)

The Act also defines "effluent limitation", but in somewhat different terms. (See Section 502(11), 33 U.S.C. § 1362(11), *supra*, at 6 n.7.) The statutory definition covers restrictions "established by *a State or* the Administrator" (emphasis added), and also ends with the admonition that the term "includ[es] schedules of compliance." (*Id.* (emphasis added).)

had consequences for the jurisdiction and timing of any judicial action brought to obtain review:

> "[T]hese guidelines fall within the provision in Section 509(b) for judicial review within 90 days of 'any effluent or other limitation under Section 301'. The effluent limitations guidelines promulgated by the Agency will implement both Section 301 and Section 304. Since it would be impossible to challenge the Section 301 limitations without challenging the Section 304(b) guidelines, the requirements in Section 509(b) that limitations promulgated pursuant to Section 301 be challenged in the United States Court of Appeals and within 90 days almost must be considered to include challenges to Section 304 guidelines." (*Id.* at 2.)

4. *EPA issues final regulations in the combined rulemaking.*

Shortly thereafter, on March 12, 1974, the Agency issued its final regulations for the 22 product subcategories of the inorganic chemicals industry. (39 *Fed. Reg.* 9611-9635; Appendix B to this brief.) Notably, EPA still called its regulations for existing plants "[e]ffluent limitations guidelines". (See, *e.g.*, 40 C.F.R. § 415.192, *added by* 39 *Fed. Reg.* 9632 (March 12, 1974), Appendix B *infra*, at 65b.) And although EPA mentioned Section 301 along with Section 304 in the preamble of the rulemaking order,[28] concurrently it asserted that "[t]he legal basis" for the regulations was that set forth in the August 1973 general notice of procedures (see *supra*, at 15-16), which of course had referred only to guideline regulations under Section 304. (39 *Fed. Reg.* at 9612, Appendix B *infra*, at 2b.)

The final "guideline" regulations for both the 1977 step and the 1983 step and the new source standards look very much alike. In particular, the guideline regulations do not specify factors nor do they contain ranges of effluent values. The 1977-step guidelines are slightly different from the other regulations

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[28] The Agency said: "This final rulemaking is promulgated pursuant to sections 301, 304(b) and (c), 306(b) and (c) and 307(c) of the Federal Water Pollution Control Act, as amended . . . ." (39 *Fed. Reg.* at 9612; Appendix B *infra*, at 2b.)

in one respect. For the 1977-step, EPA included a "modification" clause. (See, *e.g.*, 40 C.F.R. § 415.192 (first paragraph) (sodium silicate), Appendix B *infra*, at 65b–66b.) Under the clause, a permit authority may set in a permit for an individual plant limitations which are different from the regulation, if he finds that the plant's factors are "fundamentally different" from the factors "considered in the establishment of the giudelines" (presumably as specified in EPA's Development Document), and if after review in Washington the Administrator himself approves the finding and the new limitations. (*Id.*)

In sum, as a result of combined rulemaking proceedings, EPA issued final 1977-step and 1983-step guideline regulations which look very much like the new source standards promulgated at the same time. For each such regulation or standard in each product subcategory, EPA set single-number pollutant values, not ranges, and EPA nowhere specified any factors to be used in applying the numerical values to individual plants. A very limited "escape valve" was provided with the 1977-step guideline regulations. In the course of developing the regulations, the Agency had shifted its focus from the congressionally contemplated 1977-step "guidance" documents, both as to the nature of its regulations and as to their legal basis and effect.

C. Judicial Proceedings And Decisions Below

On April 1, 1973, the petitioning companies filed a complaint in the U.S. District Court for the Western District of Virginia (App. 204), seeking review of EPA's guideline regulations applicable to existing plants in the sulfuric acid production subcategory of the inorganic chemicals industry. (40 C.F.R. §§ 415.210-.213, Appendix B *infra*, at 68b–70b.) The companies asserted that the district court had jurisdiction of such a review action based upon the provisions of 28 U.S.C. §§ 1331, 1332, 1337, 1361 and 1651, the Declaratory Judgment Act, 28 U.S.C. §§ 2201-2202, and Section 10 of the Administrative Procedure Act, now codified as 5 U.S.C. §§ 701-706. Contemporaneously fifteen companies, including the eight companies involved in the District Court action, filed timely

"protective" petitions for review of the EPA inorganic-chemical guideline regulations in the U.S. Court of Appeals for the Fourth Circuit. *E.g.*, *E. I. du Pont de Nemours & Co.* v. *Train*, No. 74-1261 (4th Cir.) (App. 199).[29] Separate petitions for review were also filed respecting EPA's new source standards for the industry, issued under Section 306(b) of the Act. *E.g.*, *FMC Corp.* v. *Train*, No. 74-1296 (4th Cir.) (App. 202).

In the district court the companies promptly filed a motion seeking partial summary judgment on the issues of that court's jurisdiction and of EPA's power and obligations under the Act to issue regulations for existing plants. EPA filed a motion to dismiss the district court action based upon an asserted lack of subject matter jurisdiction.

After a hearing on the cross-motions, on September 27, 1974, the district court issued an opinion and order dismissing the complaint. *E. I. du Pont de Nemours & Co.* v. *Train*, 383 F. Supp. 1244 (W.D.Va. 1974) (App. 219). The district court adopted EPA's contentions that Section 509(b) of the Act, 33 U.S.C. § 1369(b), provided for exclusive jurisdiction of any review action in the courts of appeals. This conclusion by the court was based upon the court's acceptance of EPA's argument that the Agency had an implied power to issue effluent limitations by regulation for existing plants under Section 301 of the Act, 33 U.S.C. § 1311, and upon the reference in Section 509(b)(1)(E) to effluent limitations under Section 301. The companies had argued that for such existing plants EPA was explicitly mandated by express language in Section 304(b) of the Act, 33 U.S.C. § 1314(b), to issue guideline regulations. The companies contended that review of such guideline regulations did not fall within Section 509(b)'s special provisions for review in the courts of appeals of certain specified EPA actions. EPA had argued that the ostensible mandate of Section 304(b) for guideline regulations should be disregarded; instead, Sec-

[29] As noted, EPA took the position that review was in the court of appeals under Section 509(b)(1)(E). Where Section 509(b) governs review, paragraph 509(b)(1) requires the filing of a petition for review "within ninety days . . . ."

tion 304(b) should be construed as merely providing a "definitional" basis for establishing effluent limitations by regulation under Section 301.[30]

An expedited appeal of the district court's decision was taken to the Fourth Circuit. That appeal was consolidated for briefing and argument with the protective petitions for review.[31] The companies maintained their claim that the Agency had not followed the Act in issuing its regulations for existing plants, and they correspondingly contested the jurisdiction of the court of appeals. The companies also challenged the Agency's "guideline" regulations and new source standards for eleven of the 22 product subcategories on the ground that the regulations were not supported by the administrative record.[32]

The court of appeals issued two decisions in the consolidated cases. In the first decision (*"du Pont I"*) the court dealt with the appeal. (528 F.2d 1136, App. 240.) It upheld its own jurisdiction to review EPA's action in issuing existing plant regulations and thus affirmed the district court's dismissal of the companies' complaint. The court of appeals separated the question of the Agency's authority from the issue of jurisdiction.

[30] EPA argued in the district court that its limitation regulations were to be "mechanically cranked" into discharge permits required under the Act for particular plants, without any particular reference to a plant's individual circumstances or to the statutory factors set out in Section 304(b)(1)(B) and 304(b)(2)(B).

[31] The appeal and the protective petitions for review were ultimately consolidated for argument with the petitions seeking review of the standards for new sources. All the regulations challenged by the complaint and the petitions for review were promulgated in the same administrative proceeding upon the same record.

[32] In addition, the companies contested portions of EPA's definitional regulations, applicable generally to all the industry-category regulations. (See 40 C.F.R. § 401.11, Appendix C *infra*, at 4c-7c.) The companies had filed the protective petitions for review within 90 days both of the promulgation of the inorganic chemicals regulations and of the separate issuance of the definitional regulations. The protective petitions had sought review of EPA's action in issuing both sets of regulations. (See, *e.g.*, App. 200-201.) The companies were particularly concerned with EPA's definitions of "effluent limitations", "process waste water", and "process waste water pollutants." (40 C.F.R. § 401.11(i), (q), (r).)

diction. It ruled that promulgation by EPA of the mandated guideline regulations under Section 304(b) was a necessary step to attainment of the objectives for existing plants set out in Section 301. Consequently, action by EPA under Section 304(b) "should properly be considered to be pursuant to the provisions of [Section] 301 and, therefore, reviewable by this court under [Section] 509." (528 F.2d at 1142, App. 250.)

Then, on March 10, 1976, the court of appeals rendered its decision on the protective petitions for review. (*"du Pont II"*, App. 253.) The court sustained EPA's claim that it could issue effluent limitations by regulation under Section 301, but it ruled against the Agency on the role to be accorded those regulations. The court held that such existing-plant regulations were not binding on the permit-issuing authorities, but rather were only "presumptively applicable." (App. 262.) In administrative proceedings to establish a discharge permit for a particular plant, the permit applicant could adduce facts respecting the individual plant or facility to rebut the presumption of applicability. The court also ruled that EPA's new source standards were subject to a "rule of presumptive applicability", and it directed that EPA on remand "should come forward with some limited escape mechanism for new sources." (App. 263.)

The court then turned to the challenge to specific aspects of the regulations. It set aside the portions of EPA's definitional regulations of general applicability dealing with "process waste water", "process waste water pollutants", and "effluent limitations." (App. 262, 271.) Then the court focussed on the specific subcategory regulations. The companies had challenged all or part of the regulations for eleven different subcategories. In each instance, the court set aside those portions of the subcategory regulations which had been challenged, *i.e.*, all or part of the regulations for the production of chlorine, hydrochloric acid, hydrofluoric acid, hydrogen peroxide, nitric acid, sodium carbonate, sodium dichromate, sodium metal, sodium silicate, sulfuric acid, and titanium dioxide. (App. 272-286.)

ARGUMENT

Summary of Argument and Introduction to Argument

As the court of appeals said in *du Pont II*, the issue of the nature of EPA's regulations for existing plants "goes to the heart of the controversy." (App. 258.) For existing plants, Congress expressly and explicitly mandated in Section 304(b) that EPA issue "regulations, providing guidelines for effluent limitations . . . ." EPA well knew what Congress meant by calling for guideline regulations. At the time the 1972 Amendments were being enacted, Congress had before it an exemplar in the form of EPA's "guidance" documents prepared for use with the Refuse Act Permit Program.

The Agency's initial efforts to implement the Act were in fact directed toward the conversion of the Refuse Act Permit Program guidance documents into published guideline regulations. EPA gradually shifted course, however, and ultimately reached the point where the Agency no longer considered itself bound by Section 304's command. To establish a Washington-based control over permit-issuing authorities in the States and in its own regional offices, EPA at first asserted that its guidelines constituted and had the legal effect of "nationally uniform limitations." Then EPA moved still further away from the statute to its present position, *i.e.*, that its rules for existing plants could take the form of single-number effluent limitations issued under an authorization said to be implied from Section 301.

EPA's action in changing the nature of its existing-plant regulations, and in devising a chimerical, non-statutory legal basis for them, has provoked a series of delays in carrying out the Act's lofty promises. Section 304(b) commanded EPA to issue guideline regulations for existing plants within one year from enactment of the 1972 Amendments (October 18, 1972). EPA had issued no regulations by that deadline, and indeed now, nearly four years later, it still has not issued all of the regulations. Plant operators and permit-issuing authorities have

had difficulty resolving permits. EPA's insistence on prescribing permit terms from Washington has eliminated the benefit which Congress intended to secure by having permit-issuing authorities in States or in EPA regional offices make factual findings based upon the particular circumstances at individual plants. Congress had specifically required that EPA spell out factors in guideline regulations to promote reasoned fact-finding in permit proceedings for individual plants. As a consequence of EPA's shift in the content of and basis for its regulations, well over 200 actions have been brought in Federal courts seeking review of such regulations. As a result of these review actions, many of EPA's effluent regulations have been set aside. A number of such cases remain to be decided.

The statutory provisions themselves provide the touchstone for this Court's analysis of the functions and obligations of EPA respecting effluent regulations for existing plants. The courts of appeals for the Second, Third, Fourth, Seventh, Eighth, Tenth, and District of Columbia Circuits have struggled with these questions. Like the Fourth Circuit in these present cases, the courts of appeals were faced with reconciling on the one hand statutory provisions that explicitly provided for issuance of existing source guideline regulations which could be applied by permit authorities taking into account the wide range of situations found at the many and diverse plant sites—and on the other hand EPA's insistence that it could draw upon general provisions and inferences as authority to issue rigid single-number limitations. Given these circumstances, perhaps it is not surprising that the courts of appeals have adopted four different and conflicting views of EPA's functions in this regulatory area.

Questions of the jurisdiction of courts of appeals or of district courts to review EPA's effluent regulations for existing sources depend upon and should be analyzed after consideration of the basic issues of statutory construction.

The subsequent discussion of specific issues on the merits shows the following—

1. Section 304(b) of the Act specifically mandates that EPA issue its effluent limitations for existing plants as "guidelines for

effluent limitations", such that these guideline regulations may be used by permit authorities to establish limitations in permits for particular plants. There is no basis, express or implied, nor is there any place in the statutory scheme for EPA to promulgate limitations by regulations. EPA bases its contentions upon broad non-statutory grounds, arguing that unless it issues limitation regulations, State permit authorities will be too "lax" in applying guideline regulations. These grounds contravene policy decisions made by Congress, which structured the Act to provide for a meaningful exercise by States of permit-issuing power and, to that end, mandated guideline regulations such that either State or Federal permit authorities could deal with the great diversity in existing plants. Congress expressly required EPA to issue guideline regulations in the form of ranges of effluent pollutant values, along with a specification and elaboration of factors to guide permit-issuing authorities in selecting a particular pollutant value from the range for application to a given plant as a limitation in the plant's permit.

2. The legislative history of the 1972 Amendments to the Act supports the statutory language. The Senate Public Works Committee conducted extensive hearings and focussed on provisions to conform the Executive Branch's Refuse Act Permit Program, and the "guidance" documents being generated by EPA, to the Committee's technological wastewater treatment objectives. The Senate Committee structured a bill which contained a Section 304(b) mandating guideline regulations; the bill proclaimed the States to be primarily responsible for the control of pollution and provided in its Section 402 for issuance of permits by qualified States. That bill passed the Senate. In the House, subsequent hearings and debate occurred over the requirement in the Senate Bill that EPA approve State-developed permits before issuance, especially given the fact that EPA would issue guidelines and not standards for existing plants. The House-passed bill affirmed the States' primary responsibility and provided for EPA review of State-issued permits only in limited circumstances. Differences between the Senate- and House-passed versions were resolved in a Conference Committee Bill which retained the provisions in Section 304(b) for guideline regulations and did not authorize EPA to issue stand-

ards or limitations for existing plants. The final Bill confirmed the policy of State responsibility to administer the permit system while giving EPA authority to veto State-issued permits which are "outside the guidelines and requirements" of the Act.

3. The court of appeals tried to compromise the express statutory mandate with EPA's contrary assertions. By its compromise, the court ruled that EPA could lawfully issue single-number limitation regulations, but that these regulations were only presumptively applicable to individual plants. In permit proceedings a plant's particular circumstances could be assessed, along with the statutory factors specified in Section 304(b)(1)(B) and (b)(2)(B), to establish limitations different from those set out in the regulations. By contrast, the Eighth Circuit has required EPA to adhere to the system of guideline regulations and permits which is specified in the statutory language. Other courts of appeals have either reached a different compromise with the statute than that adopted by the Fourth Circuit in the instant cases or they have given no place whatsoever to guideline regulations. There is no basis in the statute for the several compromise decisions, or for those decisions which have entirely elided Section 304(b) from the Act.

4. EPA's present construction of the Act is not a contemporary one. It is not entitled to deference. EPA initially construed the statute as calling for guideline regulations. The Agency gradually shifted its views to accord with a developing policy of issuing regulations to be applied nationally without regard to individual circumstances. Nonetheless, the express mandate in Section 304(b) to issue guideline regulations is neither subsumed under nor overriden by any inferred regulatory power to do something different. EPA should be held to honor the requirements of Section 304(b).

5. Superimposition of limitation regulations on a statutory framework structured to accommodate guideline regulations would have an adverse effect upon a number of collateral provisions of the Act. A scientific advisory committee is charged by the Act with review of guideline regulations, and new source standards, among other things, but limitation regulations are not mentioned. The statutory provisions for periodic review

by EPA of its regulations are premised upon guidelines. Enforcement would be adversely affected; the Act is structured such that "effluent limitations" written as conditions of permits are enforceable, but the existing-plant effluent regulations themselves are not independently enforceable. Were these limitation regulations, premature judicial review actions would have to be brought under the jurisdictional provisions of the Act, and the jurisdictional provisions would be construed in such a fashion that there would be no Federal judicial review of EPA's action on State-issued permits, contrary to Congress' intent.

6. In *du Pont I*, the court of appeals was in error in concluding that it had jurisdiction over original proceedings to review guideline regulations pursuant to the terms of Section 509(b)(1) of the Act. Jurisdiction of actions to review EPA's issuance of guideline regulations properly rests with the district courts. However, this Court should apply the doctrine of pendent jurisdiction to permit, but not to require, a court of appeals to review guideline regulations where such review is an adjunct to an action properly brought under Section 509 (b)(1) for review of new source standards concurrently promulgated on the same administrative record.

I.

SECTION 304(b) OF THE ACT MANDATES THAT EPA ISSUE ITS EFFLUENT REGULATIONS FOR EXISTING PLANTS AS "GUIDELINES FOR EFFLUENT LIMITATIONS", SUCH THAT THESE GUIDELINE REGULATIONS MAY BE USED BY PERMIT AUTHORITIES TO ESTABLISH LIMITATIONS IN PERMITS FOR PARTICULAR PLANTS

The court of appeals struggled with the main question in this case and reached a compromise resolution which does not follow the statutory mandate. At issue here is the nature of EPA's statutory power to issue regulations governing the discharge of effluents from existing plants. As the court of appeals recognized, this issue has two distinct aspects. The grant of regulatory power to EPA by Congress prescribes the content of EPA's regulations, and it determines also the legal effect of the regulations and the mode of implementation of the regulations in permit proceedings.

Both of these branches of the general question are important. Analytically they are closely intertwined. Congress structured the form and content of the regulations in light of their intended purpose and legal effect. And, because EPA has sought to shift the purpose and effect of the regulations from what Congress intended, the Agency also has had to restructure their content. The court of appeals was willing to sanction EPA's shift in the form and content of the regulations, but it rejected EPA's position on the purpose and effect of the regulations. The court should have held EPA to faithful adherence to the statute in both respects, not just one.

A. The Statutory Language Requires EPA To Issue "Guideline" Regulations Under Section 304(b), Not "Limitation" Regulations Under Section 301

1. *The statute expressly states the requirements for EPA's regulations.*

Section 301 sets out the statutory objectives and timetables for existing plants. The language of the Section requires that "effluent limitations" be "achieved" by existing plants, *not* that the limitations be promulgated in regulations:

> "(b) In order to carry out the objective of this Act *there shall be achieved—*
>
> "(1)(A) not later than July 1, 1977, *effluent limitations for point sources*, other than publicly owned treatment works, (i) *which shall require the application of the best practicable control technology as defined by the Administrator pursuant to section 304(b) of the Act* . . . ."
>
> (§ 301(b), 33 U.S.C. § 1311(b) (emphasis added), Appendix A *infra*, at 3a.)[33]

[33] The comparable provisions for the 1983 objective are set out in Section 301(b)(2)(A), 33 U.S.C. § 1311(b)(2)(A).

Section 301 puts obligations on operators of plants and facilities making discharges, not on the Administrator. The Administrator's responsibilities are set out in Section 304(b):

> "(b) For the purpose of adopting or revising effluent limitations under this Act *the Administrator shall . . . publish* within one year of enactment of this title, *regulations, providing guidelines* for effluent limitations, and, at least annually thereafter, revise, if appropriate, such regulations. *Such regulations shall*—
>
> > "(1)(A) *identify*, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, *the degree of effluent reduction attainable through the application of the best practicable control technology currently available* for classes and categories of point sources (other than publicly owned treatment works); *and*
> >
> > "(B) *specify factors to be taken into account in determining the control measures and practices to be applicable to point sources* (other than publicly owned treatment works) within such categories or classes. Factors relating to assessment of best practicable control technology currently available to comply with subsection (b) (1) of section 301 of this Act shall include considerations of the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application, and shall also take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate . . . ."
> >
> > (§ 304(b), 33 U.S.C. § 1314(b) (emphasis added), Appendix A *infra*, at 7a–8a.)[34]

[34] Paragraph 304(b)(1) pertains to the Administrator's duty to issue the 1977-step guideline regulations. The following paragraph (§ 304(b)(2)) contains the requirements for the 1983-step guideline regulations. The required content of the 1983-step regulations is quite similar to that for the 1977-step regulations; for brevity, the 1983-step provisions have not been quoted in the foregoing text.

In Section 304(b), then, Congress has instructed the Administrator (a) that he is to issue regulations providing guidelines, (b) within one year from enactment of the 1972 Amendments, and (c) which have a specific content, *i.e.*, numerical values identifying the degree of effluent reduction attainable with an identified level of technology, along with a specification and elaboration of factors to be used to apply the control measures and practices to particular plants ("point sources").

2. *EPA now refuses to follow the statute, relying on broad nonstatutory grounds which contravene policy decisions made by Congress.*

Section 304(b) is sufficiently detailed and explicit in its express command to the Administrator that one might wonder why basic questions have arisen respecting the nature and effect of the Administrator's regulations. As the court of appeals put the matter in *du Pont II*:

> "Section 304(b) specifically authorizes the Administrator to publish 'regulations, providing guidelines for effluent limitations.' Nothing is said in § 301 about regulations." (App. 260.)

EPA nonetheless has argued that it draws from the Act an implied power to issue "effluent limitations" by regulation for existing plants. The Agency asserts "that the[se] regulations impose limitations which are applicable uniformly throughout the nation and, with some exceptions, must be mechanically cranked into each permit by the issuer." (App. 261.) The companies, by contrast, have consistently argued that EPA should follow the instructions Congress set out in Section 304(b). EPA should issue "guidelines" under Section 304(b) which contain both effluent values in numerical terms and a specification of factors to guide the use of the numbers by permit issuers. Congress called for such guideline regulations to enable permit-issuing authorities to cope with the diversity of existing facilities.

Faced with these disparate positions, the court of appeals ruled that EPA had implied power to issue "limitations" by

regulation under Section 301 (App. 260-261.)[35] The court decided, however, that these limitations had a legal effect much like "guidelines" under Section 304. The limitations were only "presumptively applicable", and in administrative proceedings to establish a permit for a particular plant, the permit applicant could adduce facts relating either to the special circumstances of the plant or to the statutory factors set out in Section 304(b)(1)(B) and Section 304(b)(2)(B) to rebut the presumption of applicability and to sustain different limitations. The court cited no statutory provisions in support of its conclusion that the permit issuer is to "apply" the factors. Rather, its decision seems to have been predicated upon an unwillingness to obliterate Section 304(b) completely. (See App. 266.)

The compromise decision of the court of appeals does not adhere faithfully to the terms of the Act and does not serve Congress' intent. In its decision the court in effect wrote out of the statute those portions of Section 304(b) which call for EPA's regulations to include a specification of factors to guide permit authorities and which call for EPA to identify the requisite pollutant reduction "in terms of *amounts* of constituents and . . . characteristics",[36] rather than in the one-number terms EPA used. While the court recognized the fault in EPA's rigid one-number contention, and tried to preserve some elements of Section 304(b) by its ruling that permit issuers should "apply" the factors, the court in fact practically elided Section 304(b) from the Act.

The best evidence of congressional intent in enacting Sections 301 and 304 as a major part of the 1972 Amendments is the language Congress used in the sections themselves. Section

[35] In the view of the court of appeals, "[t]he source of power to impose § 301 limitations by regulation can only come from § 501(a) which authorizes the Administrator 'to prescribe such regulations as are necessary to carry out his functions under this Act.'" (App. 260.)

[36] § 304(b)(1)(A), 33 U.S.C. § 1314(b)(1)(A) (emphasis added). The legislative history explains that EPA was to provide for a range of effluent values (see *infra*, at 65-67), such that the permit authorities could use the factors to chose the limitations for a particular plant from the range.

304(b) expressly and affirmatively commands EPA to issue a given type of regulation. In short, here EPA's powers and obligations have been set out by Congress in a "legislative affirmative description of those powers", which strongly implies that Congress denied to the Agency the powers to do something different. *Durousseau* v. *United States,* 6 Cranch [10 U.S.] 307, 314 (1810).[37] The matter is one of recognizing Congress' consistency of purpose, and not just one of applying a maxim of statutory construction:

> "The circumstances of this inquiry carry us beyond the rule of *expressio unius est exclusio alterious,* cf. *Ford* v. *United States,* 273 U.S. 593, 611, and into the domain of inconsistency of purpose. Cf. *Texas and Pacific Ry. Co.* v. *Abilene Cotton Oil Co.,* 204 U.S. 426, 436 *et seq.*"
>
> (*Continental Casualty Co.* v. *United States,* 314 U.S. 527, 533 (1942).)

Cf. *National Railroad Passenger Corp.* v. *National Association of Railroad Passengers,* 414 U.S. 453, 457-458 (1974).

Neither EPA nor this Court have any warrant to depart from the express requirements of Section 304(b) simply because the Agency now desires to do something different. EPA has arrived at its present position by fitful administrative plunges over the past four years; each of its changes in direction moved it away from the statutorily prescribed guidelines until it finally reached Washington-set limitations to be "mechanically cranked" into all permits for existing plants. EPA seems to fear that State permit and enforcement procedures may be too "lax" in some instances. (App. 193, R. 6501; see *supra,* at 19.) This "reason", however, flies in the face of the decision by Congress to "recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution,

[37] In *Durousseau* Chief Justice Marshall's opinion for the Court construed the terms of Article III, section 2, clause 2 of the Constitution and the implementing Judiciary Act, granting certain appellate jurisdiction to the Supreme Court, to except from the Court's appellate jurisdiction matters not affirmatively specified.

[and] to plan the development and use . . . of land and water resources . . . ." (§ 101(b), 33 U.S.C. § 1251(b).) Specifically, EPA is to issue guideline regulations under Section 304(b) which can be used and implemented by State permit authorities. This administrative framework cannot be overriden by EPA as a matter of its own fiat just because the EPA now apparently disagrees with Congress' decision that the Agency should share some power with States. See *Thomas Paper Stock Co.* v. *Porter*, 328 U.S. 50 (1946); *United States* v. *Carolina Freight Carriers Corp.*, 315 U.S. 475, 489 (1942). The Agency's position rests on broad policy arguments, which contravene decisions by Congress, coupled with general references to the far-reaching aims of the legislation. These are not enough. Thirty years ago, in similar circumstances, Mr. Justice Frankfurter wrote for the Court:

> "Nor can we draw on broad arguments about inflationary pressures on price control in construing legislation dealing with so technically confining a provision as that of the Taft Amendment [to the Emergency Price Control Act] . . . . Of course, all provisions of the Emergency Price Control Act are infused by its far-reaching aims. But the accommodation of the various interests involved in a system of price control is for Congress and not for us, and we must construe its legislation as fairly as we can to catch the will behind the words."
>
> (*Thomas Paper Stock Co.* v. *Porter*, *supra*, 328 U.S. at 54-55.)

In its *du Pont II* decision, the court of appeals erred in trying to compromise between the commands of the statute and the statutorily unsupported assertions of EPA. The court of appeals should have looked first to the statute. If it would have approached its decision in that light, the court would have concluded that EPA was correct in its initial efforts to convert the "guidance" documents generated for use with the Refuse Act Permit Program into "guideline" regulations meeting the requirements of Section 304(b). See *supra*, at 15. EPA should have held to that course; if it had done so, the regulations before this Court would have had a quite different content.

3. ***The conflicting decisions by various courts of appeals and district courts have arisen because a number of the courts have failed to construe the statute as written.***

While a number of courts of appeals and district courts have considered the questions posed here, those courts who did look first to the statutory provisions themselves are in a minority. Not surprisingly, however, one such court has provided perhaps the best description of what EPA must do to adhere faithfully to Section 304(b):

> "As the Court interprets the language of section 304(b), the guideline regulations to be promulgated by the EPA are meant to set forth two basic standards for both the 1977 and the 1983 technologies. First, the guidelines are to 'identify . . . the degree of effluent reduction attainable through the application of the . . . technology . . . *for classes and categories of point sources* . . . .' Section 304(b)(1)(A). (Emphasis supplied.) The Congress has directed the EPA to determine for each class or category of point sources how much effluent reduction can be achieved through the application of the appropriate technology. Second, the guidelines should specify the factors which may be taken into account in determining, *for each individual point source*, the best measures to achieve the application of the relevant technology. Thus, the guideline regulations are to be two-pronged. They should state the effluent reduction possible for the entire class or category of point sources within a given range and they should also analyze those factors deemed important for the writing of an individual permit within that range."
>
> (*Grain Processing Corp.* v. *Train*, 407 F. Supp. 96, 104 (S.D. Iowa 1976) (Stuart, J.), *appeal pending* No. 76-1233 (8th Cir.) (emphasis by the Court).)

The district court's recognition of the requirements of Section 304 for guideline regulations in the *Grain Processing* case stems from and fleshes out the Eighth Circuit's earlier decision in *CPC International Inc.* v. *Train*, 515 F.2d 1032 (8th Cir. 1975). In its *CPC* decision, the Eighth Circuit had ruled that Section 304(b), not Section 301, governed EPA's rulemaking require-

ments for its existing-plant effluent regulations. EPA had relied upon a regulatory power said to be implied from Section 301, just as it did in these *du Pont* cases.[38] The Eighth Circuit concluded that the power EPA asserted had not been granted by Congress, impliedly or otherwise, and moreover that the type of "limitation" regulation urged on the court by EPA was inconsistent both with the express requirements for regulations in Section 304(b) and with the provisions of Section 402 dealing with permits. (515 F.2d at 1037, 1038.) The Eighth Circuit found no statutory basis for accepting jurisdiction of an action to review regulations issued by EPA under Section 304(b), and accordingly it dismissed the "protective" review petitions before it.[39] The *Grain Processing* case was then brought and proceeded to decision in district court.

Other courts have not treated the statutory language with such respect. Like the Fourth Circuit in the instant cases, the Third Circuit tried to meld together EPA's assertion of authority to issue limitations on the one hand and Section 304 (b)'s express language on the other. It reached a different compromise, however. In *American Iron & Steel Institute* v. *Environmental Protection Agency*, 526 F.2d 1027 (3rd Cir. 1975), the Third Circuit held that EPA could issue "limitation" regu-

[38] There, as in these cases, EPA had "contend[ed] that, in using the passive voice, 'there shall be *achieved* . . . effluent limitations,' Congress intended to require the EPA to promulgate effluent limitations by regulation under § 301(b)." (515 F.2d at 1037.)

[39] The Eighth Circuit observed that Section 509(b) of the Act, 33 U.S.C. § 1369(b), did not specify promulgation of Section 304(b) guideline regulations as being among the expressly listed group of actions which were to be reviewed in the courts of appeals. (515 F.2d at 1037.) The court took "note that counsel for the government stated at oral argument that, if it were held that the existing source regulations had been promulgated pursuant to § 304(b), they would be reviewable in District Court." (515 F.2d at 1038 n.12.)

The Eighth Circuit took jurisdiction to review the new source standards for the corn wet milling industry; the parties had agreed that jurisdiction to review those standards was in the courts of appeals under Section 509(b) (1)(A) ("standards of performance for new sources") and (C) ("pretreatment standard for new sources"). On the merits, the Eighth Circuit determined that both the standards of performance for new sources and the pretreatment standards for new sources were not supported by the administrative record, and the court remanded the standards to the Agency. (515 F.2d at 1043-1052.)

lations pursuant to authority implied from Section 301, that such regulations were to provide a treatment " 'base level', and concomitant pollutant ceiling" (526 F.2d at 1045), and that in conjunction with the limitations the Administrator had to issue guideline regulations providing a range of more stringent controls:

> "Having determined the 'base level', and the 'ceiling', he [the Administrator] must then promulgate guidelines which are to guide the permit-issuing authorities in deciding whether, and by how much, the limitation to be applied to any individual point source is *more* stringent than the base level (in terms of requiring more effective technology), and more stringent than the ceiling (in requiring a lower amount of effluent discharge). *Thus, we reconcile sections 301 and 304 in the following manner: the section 301 limitations represent both the base level or minimum degree of effluent control permissible and the ceiling (or maximum amount of effluent discharge) permissible nationwide within a given category, and the section 304 guidelines are intended to provide precise guidance to the permit-issuing authorities in establishing a permissible level of discharge that is more stringent than the ceiling.*" (526 F.2d at 1045) (emphasis by the Court and emphasis added).)

Like the regulations in these cases, the EPA regulations before the Third Circuit "establish[ed] only single number effluent limitations for each of twelve subcategories within the iron and steel industry." (526 F.2d at 1045.) The Third Circuit ruled such regulations invalid and remanded them to EPA because they did not specify factors and did not contain ranges of pollutant values, as required by Section 304(b):

> "[T]hey do not specify any factors to be taken into account in determining the control measures to be applied to individual point sources within the categories and classes, as required by sections 304(b)(1)(B) and 304(b)(2)(B). Furthermore, they do not specify permissible 'ranges' of limitations below the ceiling."
>
> (526 F.2d at 1045.)

Like the Fourth Circuit in these cases, the Third Circuit struggled to give some effect to Section 304(b)'s provisions, notwithstanding EPA's efforts to ignore the Section, out of a recognition that Congress had written Section 304(b) to provide regulations which could be applied rationally in the permit process to the diverse situations at existing plants. (526 F.2d at 1043-1044, 1046.) The Third Circuit found a number of parts of the statute and of the legislative history "hard to reconcile" and fraught with "ambiguity" and "inconsistency". (526 F.2d at 1043, 1052 & n.51; see also Judge Adams' concurring opinion, 526 F.2d at 1073, 1074.) It is not surprising that the court found the statute to be difficult. The court was trying to engraft a system of EPA "limitation" regulations upon a framework structured by Congress to accommodate guideline regulations.

Several courts of appeals abandoned any effort whatsoever to give effect to Section 304(b). In *American Meat Institute* v. *Environmental Protection Agency*, 526 F.2d 442 (7th Cir. 1975), the petitioners raised no claims based upon EPA's failure to comply with Section 304(b) (526 F.2d at 448 n.13),[40] but rather raised only technical issues dependent upon the administrative record. Consequently, the Seventh Circuit focussed on whether the EPA industry-category regulations before the court were valid as Section 301 "limitations". In *Hooker Chemicals & Plastics Corp.* v. *Train*, __F.2d__, 8 E.R.C. 1961 (2d Cir. 1976), the Second Circuit sanctioned EPA's promulgation of limitations by regulation under Section 301. While the court's rationale is not altogether clear, it seemingly took the view that Section 304(b)'s mandate to the Administrator to issue regulations is subsumed in and overriden by a regulatory power inferred from Section 301.[41] The Second Circuit said it ruled on the

[40] The Seventh Circuit allowed *amici curiae* to raise the jurisdictional issues discussed *infra* at 85-93, but no other questions. See 526 F.2d at 448 n.12. The entire participation of the *amici* in the *American Meat Institute* case came after briefing by the parties had been completed and after the court had heard oral argument.

[41] The court said:

> "Section 304 structures the procedure and identifies the criteria for consideration whereby the Administrator in the context of industrial categories of existing effluent dischargers gives concrete definitional content to effluent limitations mandated by § 301." (8 E.R.C. at 1966.)

matter reluctantly, against a "background of puzzling statutory language, ambiguous legislative history and conflicting court decisions . . . ." (8 E.R.C. at 1965.) Finally, the District of Columbia Circuit has adopted the position that EPA could issue limitations by regulation under Section 301, and as a permissible "shortcut", could dispense with guideline regulations. *American Frozen Food Institute* v. *Train*, __U.S. App. D.C. __, __F.2d __, 8 E.R.C. 1993, 2007 (1976) (opinion by Judge Edwards of the Sixth Circuit, sitting by designation). The District of Columbia Circuit ruled EPA initially had a duty to issue guideline regulations under Section 304(b), but that "thereafter as a subsequent 'phase'" the Administrator was to issue limitation regulations under Section 301(b). (*Id.*)[42]

This Court thus faces a spectrum of views presented by the courts of appeals and district courts. The Eighth Circuit's *CPC* decision, considered with the district court's *Grain Processing* ruling, gave full effect to Section 304(b) as written. In reaching their different compromises, the Fourth Circuit in the present case (*du Pont II*) and the Third Circuit in the *American Iron & Steel* decision sought to give some place to Section

[42] The petitioning potato processing companies in that case had taken that view based upon dicta in *Natural Resources Defense Council, Inc.* v. *Train*, 166 U.S. App. D.C. 312, 510 F.2d 692, 709-710 & n.101 (1975). The dicta were prompted by a description of EPA's powers and responsibilities set out in supplemental briefs filed in the *NRDC* case on the issues (1) of whether the court could responsibly mandate the issuance of Section 304(b) guideline regulations on a strict time schedule when the Agency had shown that additional time was necessary, and (2) of whether EPA was obliged to publish guideline regulations for *all* industrial classes and categories by such a flat deadline. These two issues were at the heart of the *NRDC* case but are only tangentially related, if pertinent at all, to the question before this Court in the instant cases.

In the *NRDC* case, the court issued an amendment to its original opinion to emphasize it was not ruling on the nature of EPA's regulations—

> "We do not rule on the propriety of the Administrator's regulations implementing sections 301 and 304 or on the validity of the form, format, or content of any particular effluent guidelines or limitations previously promulgated by EPA. Such matters involve questions that go beyond our present focus on the time limits contemplated by the Act for publication of section 304(b)(1)(A) effluent limitation guidelines." (510 F.2d at 710 n.101.)

304(b) in the statutory framework. In contrast, the several circuits which have approved EPA's effluent regulations as limitations under Section 301 have sanctioned eliding Section 304(b) from the Act.

Congress did not inadvertently fail to provide expressly in Section 301 for regulations. There was no oversight, such that courts should imply or infer authority to issue limitations. The regulations governing effluents from existing plants are the most important regulations to be issued under the Act. It simply is not credible that Congress would write detailed provisions for such regulations in Section 304(b), and then intend to override the Section 304(b) regulations thus expressly specified with limitation regulations inferred or implied from Section 301. See *Durousseau* v. *United States*, 6 Cranch [10 U.S.] 307, 314-315 (1810); *Continental Casualty Co.* v. *United States*, 314 U.S. 527, 533 (1942). Congress wrote its intent into the statutory words; it did not leave such crucial matters to inference and happenstance.[43]

Congress had sound reasons for prescribing that the existing-source regulations be issued in the form of guidelines. Regulations in the form of guidelines would provide permit issuers with detailed instructions covering the application of technology-based requirements to many different individual plant situations. When Congress enacted the 1972 Amendments it had before it examples of guideline regulations in the form of EPA's own "guidance" documents for the Refuse Act Permit Program. EPA should be held to comply with the terms of the Act, not to its own desire as a policy matter to promulgate regulations which would negate the existence of any decision-

[43] During the Senate debate on the Conference Committee's report respecting the 1972 Amendments, Senator Muskie said

"I would like to call attention to the fact that *we have tried in this legislation not to leave the final evaluation of the bill to the legislative history, but instead to write into law as clearly as possible the intent of Congress.*" (118 Cong. Rec. 33693 (1972), *Leg. Hist.* at 163-164 (emphasis added).)

He made these remarks in introducing for the record his own summary of the Conference Committee's deliberations. As will appear from subsequent discussion, *infra* at 60-63, Senator Muskie's summary is itself not faithful to the statutory language in certain respects.

making role for permit authorities in qualified States while at the same time arrogating to itself the power which properly belongs to such authorities.[44]

B. The Legislative History Of The 1972 Amendments Confirms The Statutory Mandate For Issuance Of Section 304(b) Guideline Regulations, Not Limitation Regulations

Before the 1972 Amendments were enacted, the Federal Water Pollution Control Act had relied solely on water quality standards which were difficult to match with a discharge from any given plant or other facility.[45] In an effort to solve this

[44] EPA's reading of Section 301 is also inconsistent with Section 301(b)(1)(C) (33 U.S.C. § 1311(b)). Subsection (b)(1)(C) provides:

"(b) In order to carry out the objective of this Act there shall be achieved—

(1) . . .

(C) Not later than July 1, 1977 *any more stringent limitation*, including those necessary to meet water quality standards, or schedules of compliance, *established pursuant to any State law or regulations* (under authority preserved by section 510) or any other Federal law or regulation, or required *to implement* any applicable water quality standard established pursuant to this Act." (Emphasis supplied.)

The reference to "any more stringent limitation" (in the singular) established pursuant to State law or regulation or to "implement" a water quality standard can only refer to a limitation in a permit; it is not consistent with limitations by regulation.

[45] The Eighth Circuit described some of the difficulties in *CPC International Inc.* v. *Train, supra*, 515 F.2d at 1034-1035:

"The Federal Water Pollution Control Act Amendments of 1972 restructure the federal program for water pollution control. The 1972 Act was enacted against a background of frustration and ineffectiveness in controlling the quality of the nation's waters. The keystone of the pre-1972 program had been the setting of 'water quality standards' for interstate navigable waters. Under that program, if wastes discharged into receiving waters reduced the quality below permissible standards, legal action could be commenced against the discharger. To establish that a given polluter had violated the federal legislation, a plaintiff had to cross a virtually unbridgeable causal gap by demonstrating that the cause of the unacceptable water quality was the effluent being discharged by the defendant. The enforcement mechanism of the prior legislation was so unwieldy that only one case had reached the courts in more than two decades."

See also *Environmental Protection Agency* v. *California*, — U.S. —, 44 U.S.L.W. 4781 (U.S., June 7, 1976).

problem, the Executive Branch looked to a seventy-year-old statute, the Refuse Act, 33 U.S.C. § 407, as a basis for a permit program to be applicable to individual dischargers. The Refuse Act Permit Program had been established by a Presidential Executive Order published on Christmas Day, 1970. See *supra*, at 14 n.21. For certain industries subject to the Refuse Act Program, EPA had prepared "guidance" documents specifying ranges of discharge levels obtainable by application of "best practicable" treatment technology.[46]

The Refuse Act Permit Program was in the process of implementation when the 1972 Amendments were being developed by Congress.[47] In writing the portions of the 1972 Amendments pertinent to these cases, Congress took upon itself the task of "conforming" the Refuse Act Permit Program and the guidance documents to its own technological objectives, and of supplying a firm statutory basis for requiring dischargers to have permits.[48]. A colloquy during hearings of the Senate Committee on Public Works between Senator Muskie and then-Assistant Administrator Quarles, now Deputy Administrator, is illustrative:

> Senator Muskie. It is going to be your objective, as I understand it, to set effluent standards which are the equivalent of secondary treatment. That is to be the standard, am I correct?
>
> Mr. Quarles. I think maybe you should develop your question a little bit more.

[46] The "guidance" document for the inorganic chemicals industry appears at App. 8-20, R. 2550-2567. See *supra*, at 14-15.

[47] As early as September 1971 EPA announced that effluent guides for 20 industry categories including inorganic chemicals would be provided to EPA regional offices in October and would be made available to the public in November. BNA, *Environment Reporter*, Current Developments, at 570 (September 17, 1971).

[48] In *Kalur* v. *Resor*, 335 F. Supp. 1 (D.D.C. 1971), operation of the Refuse Act Permit Program was enjoined after only 21 or 22 permits had been issued. The Refuse Act Permit Program also did not cover publicly owned sewers and treatment works. See 33 U.S.C. § 407 ("any refuse matter . . . other than that flowing from streets and sewers and passing therefrom in a liquid state . . . .")

> Senator Muskie. The Water Quality Standards Act undertakes to establish water quality standards that are related to the uses which the States and localities decide ought to be served by the waterways or water resources of an area or of a city . . . .
>
> . . . .
>
> As I understand what you are doing in order to conform your program to the water quality standards program, *you are seeking to establish effluent standards that are related to some determination as to what secondary treatment of industrial effluents may be.*
>
> Mr. Quarles. *That is one of the objectives of the program that we are going through now studying 20 basic industries and attempting to come up with some guidelines or guidance on establishment of effluent requirements.* We had some discussion in your absence of the establishment of the water quality standards and implementation plan requirements . . . .
>
> Industry doesn't know and nobody else does either just what they are being asked to put in, and in every case, in order for an industry to have a target to shoot for, there does need to be some sort of specification of the effluent. *We are trying to put ourselves in a better position to specify what the effluent should be, but we do not intend to adopt or issue on any wholesale flat across-the-board basis a set of effluent rules that would simply specify what the equivalent of secondary water treatment would be and then that be applied irrespective of local conditions.*
>
> Senator Muskie. Now, I would like to identify what I think are the key policy decision areas which confront us as we try to conform your permit program with whatever legislation this committee develops.
>
> First of all, to move toward a further development of the Water Quality Standards Act or further development of the permit system, we need an information base . . . .
>
> The objective, it seems to me, ought to be to establish as simple and direct procedures as possible to insure assem-

bling the essential data as quickly as possible, to focus responsibility on establishment, and to minimize confusion and duplication of effort for industry or for Government. It seems to me that is the first problem we face.

> Second, we have the question of timetables for the assembling of information, for filing of forms to present that information to the appropriate Government agencies, and for meeting of performance standards.
>
> Since we have a timetable problem with respect to both permits and the water quality standards program, it seems to me that we ought to focus upon conforming the two if it is possible.
>
> . . . .
>
> Under the administration bill and my bill, we have a timetable. I indicated earlier that this would begin to run about January 1, 1973. It is not clear at this point how the permit program relates to that timetable. I think it ought to be made clear. If we need legislation to make it clear, we ought to have legislation to make it clear.
>
> (*Hearings on Water Pollution Control Legislation Before the Subcommittee on Air and Water Pollution of the Senate Committee on Public Works*, 92d Cong., 1st Sess., pt. 9 (Refuse Act Permit Program), at 4370-4371 (1971) (emphasis added) (hereinafter cited as "Senate Hearings").)

EPA had supplied the Senate Public Works Committee with summaries of its pre-guidance "state-of-the-art" papers for nine industry categories, and had told Congress of its intention to establish "guidelines" based on the information it was gathering:

> "EPA has underway an intensive program, both within the agency and under contract, to ascertain the amounts and characteristics of industrial wastes, the present technology employed to control and abate such wastes, and the technology available now and in the foreseeable future to deal with these wastes. *On the basis of this information, EPA will establish guidelines for base levels of treatment for 22 major categories of industry.* Summaries of our current information concerning the state-of-the-art are provided for the record with respect to the following industries: petroleum and coal products; metal and metal products; chemical and allied products; paper and allied products; machinery and transportation equipment; textile mill products; rubber and plastics; and food and kindred products.
>
> (Senate Hearings, at 449 (emphasis added).)

At that early stage, EPA knew that existing plants were sufficiently diverse that guidelines rather than single-number limitations were required. The Senate Hearings contain a reprint of a memorandum dated July 15, 1971, to EPA's Regional Administrators regarding the Refuse Act permit program. (Senate Hearings, at 1834-1835.) In the memorandum, Mr. John Quarles, then Assistant Administrator for Enforcement and General Counsel of EPA (now Deputy Administrator) referred to the ongoing industry studies and the preparation of guidance documents to give advice to the EPA permit officers:

> "After careful review, however, it has been concluded that it is not possible at this time to issue any formal set of guidelines setting forth a method of computation by which a specific discharge might be determined for general application in the Permit Program, either as the equivalent of secondary treatment or as a best available treatment. The complexities of such determinations, *together with the infinite variations from case to case*, indicate that the establishment of effluent specifications cannot be reduced to simple formula computation. . . .
>
> "The effluent computation formulas which will be furnished to you, when available, may be used to supplement existing techniques for establishment of effluent specifications. They will provide a quick method to determine whether proposed specifications are within normal *range* but will not reduce the need for careful exercise of professional judgment. We also anticipate that the additional material contained in the reports will be of great value as reference materials covering *a wide span of industrial situations*." (*Id.* at 1835 (emphasis added).)

Similarly, in the "Scope of Work" provisions in a contract to study the organic chemicals manufacturing industry in connection with the guidance program, (reprinted in the Senate Hearings, at 1838-1875) EPA stated:

> "For effluent standards to have meaning and be realistic control devices, the following must be satisfied:
>
> . . . .
>
> 3. Must be technically reasonable—generally speaking, degrees of industrial waste water treatment are as dependent on economic factors as on technological capabilities. Therefore, the same across-the-board treatment requirements for all industries are not reasonable. Different industries and *different plants within an industry require different types of effluent treatment processes. The degree of difficulty of treatment and in-plant control also varies among industries and plants.* Therefore, an effluent standards program must take into account the level and type of treatment and control a particular industry is capable of providing within current day technology." (*Id.* at 1868-1869 (emphasis added).)

The "Scope of Work" provisions direct the contractor to determine a base level of treatment which all dischargers must meet and a range of effluent requirements. (*Id.* at 1869-1874.) These policy considerations were reflected in the guidance documents.[49]

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[49] For example, in the guidance document for the inorganic chemicals industry EPA described what it called "requirements" for the development of effluent guidelines. The second requirement was that "[a] *range* of achievable waste loads was to be established, with the stricter Schedule A requirements at the upper limits of the range and Schedule B at the bottom." (R. 2570 (emphasis in original).) In another part of the document EPA said that "economic and social factors may affect the practicability of applying control techniques to achieve these values, and may require some modification of Schedule A values as to particular plants. . . . Guidance on the economic and social factors which may require that you consider such modifications . . . will be provided at technical seminars to be conducted concerning each industrial category." (App. 8-9, R. 2551.)

Congress thus had a rather detailed knowledge of EPA's program of developing guidance documents for use in conjunction with the Refuse Act Permit Program. Based on this information, and its own judgment as to technological objectives and the desired interplay of State and Federal agencies in a permit system, the Senate began to develop the 1972 Amendments. The Senate Bill as reported from the Public Works Committee set a regulatory pattern confirming a permit program, providing for primary reliance on technological effluent requirements rather than water quality standards, and relying upon Federal (EPA) guideline regulations to provide the necessary flexibility for permits at existing plants. Uniform national technological objectives for effluents were specified in Section 301. These objectives were to be spelled out by guideline regulations issued pursuant to Section 304(b). And the Section 304(b) guideline regulations would provide the basis for permit authorities to set effluent limitations in permits issued under Section 402 which result in the achievement of the technological objectives of Section 301. The Senate Report on S. 2770, 92d Cong., 1st Sess., the bill which became the 1972 Amendments, succinctly summarizes this regulatory pattern:

> *"Subsection (b) of this section [304] requires the Administrator, within one year after enactment, to publish guidelines for setting effluent limitations reflecting the mandate of section 301, which will be imposed as conditions of permits issued under section 402.* These guidelines would identify what constituted the "best practicable control technology currently available" and the "best available control measures and practices," and the degree of effluent reduction attainable through the application of each. Thus, these guidelines would define the effluent limitations required by the first and second phases of the program established under section 301. In addition, the Administrator would identify control measures and practices available to eliminate the discharge of pollutants from any category of point sources, to allow the full implementation of the objectives of the Act."

(S. Rep. No. 92-414, 92d Cong., 1st Sess., at 51 (1971), 2 *Leg. Hist.* at 1469 (emphasis added).) [50]

The same statutory pattern was described in a colloquy between Senator Muskie and Senator Mathias during Senate consideration of the bill which ultimately became the 1972 Amendments:

> Mr. Mathias. Does Section 301(b)(2)(A) on page 76 contemplate that a State or the Administrator if appropriate, might be able to set the 1981 effluent limitations almost on an individual point source by point source basis?
>
> Mr. Muskie. Section 301(b)(2)(A), as well as section 301(b)(1) anticipates individual application of controls under the permit program established under section 402.
>
> . . .
>
> "Criteria under Section 304(a) are to be applied in determining quality of water not in setting effluent limitations. *The information under Section 304(b) is to be applied in setting effluent limitations.*"
>
> (117 Cong. Rec. 38855 (1971), 2 *Leg. Hist.* at 1391 (emphasis added).)

The House took up its bill after the Senate has passed its version. Like the Senate, the House provided for effluent regulations for existing plants in the form of guideline regulations. (H. Rep. No. 92-911, 92d Cong., 2d Sess., at 107-108 (1972), 1 *Leg. Hist.* at 794-795.)[51]

[50] This pattern is restated in other portions of the Senate Report:

> "Through the permit program established under section 402, with the help of those States which have effective programs, the Administrator and the States can and should by mid-1973, be able to apply specific effluent limitations for each industrial source. . . ." (*Id.* at 44, 2 *Leg. Hist.* at 1462.)
>
> "It is acknowledged that the time allotted for publication of information under this section [section 304], is short. *The Committee expects however, that the Refuse Act experience should enable the Administrator to comply.* In addition, of course, the Committee desires to make it possible for State programs to qualify for participation in the permit program under section 402 as soon as possible after the date of enactment." (*Id.* at 54, 2 *Leg. Hist.* at 1472 (emphasis added).)
>
> "A permit or equivalent program, properly implemented and fully utilizing the resources of the State and Federal Government should provide for the most expeditious water pollution elimination program.
>
> "The information on the technology of control developed under Section 304 should facilitate the administration of this system." (*Id.* at 72, 2 *Leg. Hist.* at 1490.)

In the House, concern centered on the role the guidelines would have in the permit process, and the degree to which EPA could review and override State permit authorities. In floor debate in the House, Representative Sikes noted that the Senate had provided for States to propose permits which would be issued upon EPA's approval [52] but that he preferred the House Committee's provision for State issuance of permits:

> "The Senate Bill would require all industry and designated plants to secure permits indicating the volume of discharge and type of pollution being discharged. The Senate version leaves all permit and enforcement policies with the Federal Environmental Protection Agency.
>
> "The House version would require EPA to provide guidelines [Section 304] and leave enforcement to the States so long as they maintain Federal standards. [Section 402] This is one of the major objections of the environmentalists."
>
> (118 Cong. Rec. 10799 (1972), 1 *Leg. Hist.* at 740.)

[51] In a letter to Representative Blatnik, Chairman of the House Public Works Committee, Administrator Ruckelshaus of EPA made several comments on the pending House Bill which are pertinent here. (The letter is attached to the House Report. *Id.* at 147-171, 1 *Leg. Hist.* at 834-858.) In that letter, EPA construed Section 301(b)(1) and 301(b)(2) as calling for the achievement of "point source effluent controls", and made no mention of limitations by regulations. (*Id.* at 155-156, 1 *Leg. Hist.* at 842-843.) In the same letter, Administrator Ruckelshaus opposed shifting from "best practicable treatment" to "best available treatment", pointing out:

> "We believe that 'best practicable treatment' representing a *range* of technology should continue as a base. It is to be expected that the base or threshold of that *range* will be higher in 1976 than it is today." (*Id.* at 156, 1 *Leg. Hist.* at 843 (emphasis added).)

He said EPA favored the permit system in the Bill, adding:

> "Section 304. For the purpose of assisting the States, EPA would be required to publish . . . (2) guidelines for effluent limitations. . . ." (*Id.* at 158, 1 *Leg. Hist.* at 845.)

[52] Section 402(d)(2) of the Senate Bill had provided:

> "No [State-proposed] permit shall issue until the Administrator is satisfied that the conditions to be imposed by the State meet the requirements of this Act." (S. 2770, 92d Cong., 1st Sess., at § 402(d)(2) (1971), 2 *Leg. Hist.* at 1690.)

The House Bill, however, provided a veto power only where an affected State, other than one issuing the permit, objected in writing to the Administrator. (See H.R. 11896, 92d Cong., 2d Sess., §§ 402(b)(5), 402(d)(2) (1972), 1 *Leg. Hist.* at 1056–1059.) The House Bill and Committee Report adopted the view taken by State Governors and others who had "deplored the duplication and second guessing that could go on if the Administrator could veto the State decisions." (H. Rep. 92-911, 92d Cong., 2d Sess., at 127 (1972), 1 *Leg. Hist.* at 814.) The House Bill's omission of any EPA review over State-issued permits placed a greater burden on the Section 304(b) guidelines, insofar as Federal power was concerned. Representatives Abzug and Rangel submitted separate views attached to the House Committee Report. They argued that EPA should have a veto power because the Act did not call for issuance of effluent *standards* for existing plants:

> "*The Bill would repeal President Nixon's permit program and hand it over to state control* after enactment *with* no guaranteed Federal review of permits issued by States and *no national minimum effluent requirements for each State permit.* This will surely result in some companies having a competitive advantage over others and loss of jobs."
>
> (H. Rep. 92-911, 92d Cong., 2d Sess., at 398 (1972), 1 *Leg. Hist.* at 867 (emphasis added and some capitalization deleted).)

Representatives Abzug and Rangel offered two alternative proposals to the House Bill. They asked that the provisions for State permits be deleted entirely, or at least that EPA be given veto authority over State-issued permits:

> "We recommend that section 402 be eliminated from the bill, and that the present permit program, established by Executive Order 11574, be retained.
>
> "If this is not done, and the States are allowed to issue permits, then, at the very least, the bill should give EPA authority

> (a) to review all permit applications, and
>
> (b) to prevent the issuance of any permit to which it objects."
>
> (*Id.* at 401-402, 1 *Leg. Hist.* at 870-871.)

Also in separate views to the Committee Report, Representative Terry focussed on the permit program and on the provisions for guideline regulations. However, he was concerned that the Act did not include the Administrator's promulgation of guideline regulations among the actions of the Administrator which were subject to the Bill's special judicial-review provisions:

> "Many . . . significant areas in the legislation where the administrator has a great deal of discretionary action are . . . without [judicial] review. These include . . . Section 304, the Federal guidelines . . . .
>
> "Since the permit program is fundamental to implementation of the Act, and *guidelines promulgated by EPA under Section 304 are key to the pollution control conditions for discharge under the permits,* whether issued by EPA or by a state . . . an administrative review procedure of Section 304 guidelines . . . is essential."
>
> (*Id.* at 424, 1 *Leg. Hist.* at 892 (emphasis added).)

The disagreement spilled over onto the floor of the House. During House debate, Representative Robison defended the House Committee version of Section 402(d), which had no practical veto power for EPA over State-issued permits, by referring to EPA's promulgation of guideline regulations under Section 304(b):

> "The organized environmentalists argue . . . that it is essential for EPA to retain . . . the right to veto any State-issued discharge permit . . . to insure uniform water quality standards across the Nation . . . . But these arguments miss the point that it is EPA, under the House bill, which will set, in the first instance, the uniform, national standards *by way of guidelines*—with which all State programs will have to comply. And they seem to miss . . . the further point that, if any State's pattern and practice of permit

issuance began to clearly deviate from those uniform *guidelines*, then EPA could recapture the enforcement initiative therein."

(118 Cong. Rec. 10795 (1972), 1 *Leg. Hist.* at 727 (emphasis added).)

On the floor, Representative Reuss offered an amendment which would have had the Administrator exercise a permit-by-permit review and veto authority over State-issued permits. (118 Cong. Rec. 10662 (1972), 1 *Leg. Hist.* at 576.) This Amendment was defeated by a teller vote of 154 to 251. (*Id.* at 10664, 1 *Leg. Hist.* at 582.)

The differing House and Senate Bills were resolved in a Conference Committee. The conferees did *not* provide for nationally promulgated effluent standards for existing sources.[53]

[53] The legislative history makes clear that Congress understood the differences between guidelines and standards and intended the differences because of the different functions of guidelines and standards under the Act. For example, Section 304(f)(1) provides in part:

"(f)(1) For the purpose of assisting States in carrying out programs under Section 402 of this Act, the Administrator shall publish within one hundred and twenty days after the enactment of this title, and review at least annually thereafter and, if appropriate, revise guidelines for, pretreatment of pollutants, which he determines are not susceptible to treatment by publicly owned treatment works."

Although Section 304(f)(1) requires EPA to issue pretreatment guidelines, Section 307(b) directs the Administrator in addition to issue proposed pretreatment standards within 180 days and to issue final pretreatment standards within 90 days thereafter. (Section 307(b)(3) authorizes the pretreatment standards to be published by categories of sources.) With reference to these provisions the Senate Report states:

"Section 304 . . . requires the Administrator to publish information on processes, procedures, or operating methods resulting in the elimination or reduction of the discharge of pollutants. This information is necessary to implement the standards of performance for new sources under section 306, and alternative waste treatment management techniques and systems available to implement section 301. He is also required to publish guidelines for establishing pretreatment standards for pollutants discharged into publicly owned treatment works, and guidelines for establishing procedures and test protocols the analysis of pollutants in permit applications. *It should be noted that this authority is in addition to the authority of the Administrator to establish pretreatment standards directly under section 307.*"
S. Rep. No. 92-414, 92d Cong., 1st Sess. at 54, 2 *Leg. Hist.* at 1472 (emphasis added).

Rather, they retained the provisions in Section 304(b) calling for the Administrator to issue guideline regulations. The conferees did adjust the provisions in Section 402(d)(2) respecting EPA oversight of State-issued permits. The conferees adopted new language providing that the Administrator would have veto authority over State permits if such permits did not comply with the guideline regulations:

"No permit shall issue . . . if the Administrator . . . objects in writing to the issuance of such permit as being outside the *guidelines* and requirements of this Act."

(§ 402(d)(1) (emphasis added).)

See also S. Rep. No. 92-1236, 92d Cong., 2d Sess., at 140 (1972), 1 *Leg. Hist.* at 323 (Conference Report).

In discussing Section 304, the Conference Report addressed the fact that the effluent regulations were to be issued as guidelines under that section, and that they were to have a precise content to aid their application to individual plants in the permits:

"Except as provided in section 301(c) of this Act, the intent of the Conferees is that effluent limitations applicable to individual point sources within a given category or class be as uniform as possible. The Administrator is expected to *be precise in his guidelines* under subsection (b) of this section [304], *so as to assure that similar point sources with similar characteristics*, regardless of their location or the nature of the water into which the discharge is made, *will meet similar effluent limitations.*

(*Id.* at 126, 1 *Leg. Hist.* at 309 (emphasis added).)[54]

During consideration of the Conference Report on the Senate floor, Senator Muskie's summary was equally as explicit, and indeed emphatic, that State-issued permits had to comply with guideline regulations issued under Section 304(b) or face the Administrator's veto:

[54] Notably, the Conference Report contemplated that the limitations "within" a given category or class should be "as uniform as possible." It did not intend single number limitations regardless of differences in situations; indeed it did not state, or in any way suggest, that *similar* point sources would have to meet *identical* effluent limitations.

"The Conference agreement provides that the Administrator may review any permit issued pursuant to this Act as to its consistency with the guidelines and requirements of the Act. Should the Administrator find that a permit is proposed which does not conform to the guidelines issued under section 304 and other requirements of the Act, he shall notify the State of his determination, and the permit cannot issue until the Administrator determines that the necessary changes have been made to assure compliance with such guidelines and requirements."

(118 Cong. Rec. 33698 (1972), 1 *Leg. Hist.* at 176.)

In the House, Representative Jones of Alabama, the floor manager for the House Conferees, compared the guideline regulations which EPA was to issue under Section 304(b) with the guideline regulations to be issued under Section 403 (respecting ocean discharge criteria).[55] Both sets of guideline regulations were to be followed by State permit authorities and were to constitute the basis on which the Administrator could veto individual permits:

"In answer to questions raised regarding changes made in section 402, relating to State permit programs, and in section 403, relating to ocean discharges, the record should show that the authority of the States to develop and administer a permit program under section 402 for discharges into the territorial sea is the same as the authority under section 402 for a State permit program for other discharges. It is the responsibility of the Administrator of EPA to establish guidelines for State permit programs. *The factors and considerations involved in setting guidelines for territorial sea discharges would necessarily differ in some respects from those established for discharges into other navigable waters.* For example, the Administrator should consider the unique situation in States where geography and other such factors have a substantial impact on the effects of the discharges on receiving waters.

"Once guidelines are established for a State permit program under section 402, whether for discharges into the

[55] Like Section 304(b), Section 403(c) explicitly requires the Administrator to "promulgate guidelines", reflecting a wide range of factors.

territorial sea or other navigable waters *it is intended that the State shall have primary responsibility for determining whether a discharge complies with the guidelines.* If the State fails to carry out its responsibility or misuses the permit program, the Administrator is fully authorized to withdraw his approval of the State plan or *in the case of an individual permit which does not meet regulations and guidelines in the act*, preclude the issuance of such permit. It is intended, however, that the Administrator shall not take such action except upon a clear showing of failure on the part of the State to follow the guidelines or otherwise to comply with the law."

(118 Cong. Rec. 33750 (1972), 1 *Leg. Hist.* at 233-234 (emphasis added).)

In large measure, principles of federalism underlie the Congressional debate and discourse concerning the nature of the effluent regulations for existing sources and the Federal review of State-issued permits. EPA now says it cannot trust the States because they may be too "lax" (see *supra*, at 19), and accordingly that it must have implied power to issue "limitations" by regulations. But EPA's arguments at this juncture cannot change the fact that Congress decided the issue of State responsibility in favor of the States. Representative John Blatnik, Chairman of the House Public Works Committee, stated the position of the Committee:

"An effective water pollution control program must have significant participation at the regional and local level. Your committee believes that the majority of the program must be handled at that level of government which is sufficiently close to the problems to recognize them and to determine what is best for the waterway and area concerned. Obviously, these local and regional efforts must be within the framework and goals set out by Congress. However, let us not kid ourselves that the Federal establishment operating by itself can implement an effective water quality program. *Unless we have meaningful local and State participation and not a Federal dictatorship, the program will founder on the rocks of the generally inflexible [,] Washington dictated approach.* Local and State initiative will disappear. Those with the most incentive to

work for local, State, and regional water quality will be stifled by Federal rigidity. We must not let this happen. We must preserve this local and State initiative.

"H.R. 11896 sets a framework and the guidelines for State water quality programs. It then provides for State implementation, or, if the States do not do the job, Federal takeover. Also, and I emphasize this, let there be no question in your minds, *this bill requires that State and regional programs follow stringent Federal guidelines. It will not allow the industrial equivalent of forum shopping. Each State's program will preclude this because they must be consistent with the guidelines.*"

(118 Cong. Rec. 10206 (1972), 1 *Leg. Hist.* at 355-356 (emphasis added).)

Representative Kluczyuski described the necessity of State attention to details even more graphically:

"I support this bill because it is absolutely sound in concept. It assigns the responsibilities where they can best be handled and *abandons the outmoded idea that all wisdom and resolution in confronting national problems is found within a 25-mile radius of the Capitol dome.*

"The States must play a prominent part in making the water pollution law work. Why should we believe their conviction is any less than ours? It is at the State and local levels where all the elements included in this bill come together, and where the job of cleaning up the water must be merged with economic and social realities."

(118 Cong. Rec. 10209 (1972), 1 *Leg. Hist.* at 363 (emphasis added).)

State authorities were not to be mere scriveners whose only task is to "mechanically crank" EPA-promulgated national standards ("limitations") into permits.[56] Where Congress desired EPA to issue national standards, it wrote language into the Act providing unambiguously for the promulgation of such standards. As the Eighth Circuit noted in the *CPC* case:

[56] The reference to "mechanically crank" limitations into permits is EPA's own characterization. It stems from the district court proceedings in this case.

"Nationally promulgated standards were expressly mandated for new sources in § 306(b)(1)(B), for toxic discharges in § 307(a)(2), and for pretreatment standards in § 307(b) and (c). In providing for national standards in these areas, Congress did four things: (1) it used the term 'standards', a word which takes on a special meaning because of its use under the Act; (2) it expressly provided that the standards were to be published by regulation; (3) it put deadlines on the process, requiring that the Administrator publish the standards within a fixed period of time; and (4) it provided that standards were to be enforceable independently of the permit system. See § 306(c); § 307(d)."

(*CPC International Inc.* v. *Train*, 515 F.2d 1032, 1038 (8th Cir. 1975).)

Moreover, at the time the law was passed in October 1972, EPA understood and agreed with the role that Congress intended the guidelines to play in the permit process. Mr. Ruckelshaus, then Administrator of EPA, in a speech before the Water Pollution Control Federation in October 1972 entitled "Local Initiative In Pollution Control", pointed out that the guideline regulations would provide the means to enable States in the permit process to consider the factors that differentiate every plant from others and to make an individual determination as to the best practicable control technology for each plant:

"We have already begun an intensive effort to begin identifying the levels of control in various industrial categories that do represent the best practicable technology now available. In doing so we are well aware—and we will act in accordance with that awareness—that there is no way that anyone in Washington can properly prepare a document that specifies the effluent limitations for all of the tens of thousands of plants across the country.

"Every plant involves individual factors that differentiate it from others and directly affect what would be the best practicable control technology for that plant. The EPA's guidelines, when they are issued, will represent the most comprehensive effort ever made on a national basis to provide information with respect to industrial waste

control technology. However, doing the job at specific plants will take the fulltime efforts of hundreds of federal and state pollution control people working as a team, and it will take years to accomplish."

(45 *Journal Of The Water Pollution Control Federation*, at 2 (1973).)

One further aspect of the legislative history deserves attention. Several of the courts of appeals had particular difficulty with the fact that the legislative history is in conflict over whether the factors set out in Section 304(b), and required by that Section to be specified in the guideline regulations, should be considered and applied to particular plants in permit proceedings. See, *e.g.*, *American Iron & Steel Institute* v. *Environmental Protection Agency*, 526 F.2d 1027, 1042-1045 (3d Cir. 1975); *Hooker Chemicals & Plastics Corp.* v. *Train*, __F.2d__, 8 E.R.C. 1961, 1966 (2d Cir. 1976). The difficulty is not a real one, however, because the statute is not ambiguous.

Most of the trouble comes from Senator Muskie's statement purporting to provide a summary of the Conference Committee Bill.[57] In Senator Muskie's summary, he stated:

"The Conferees intend that the factors described in Section 304(b) be considered only within classes or categories of point sources and that such factors not be considered at the time of the application of an effluent limitation to an individual point source within such a category or class."

(118 Cong. Rec. 33697 (1972), 1 *Leg. Hist.* at 172.)

In contrast, the earlier Senate Report, after referring to the Section 304(b) factors, had stated:

"In applying effluent limitations to any individual plant, the factors cited above should be applied to that specific plant."

(S. Rep. 92-414, 92d Cong., 1st Sess., at 50 (1971), 2 *Leg. Hist.* at 1468.)

[57] See *supra*, at 42 n.43.

The provisions of Section 304(b) in the Senate Bill were the same as those in the Bill reported by the Conference Committee.

Of course, Senator Muskie had no authority to speak for the conferees. Significantly, Senator Muskie's summary drew a sharp rejoinder from Senator Jackson, who characterized the summary as a "back-door attempt at legislation":

"A back-door attempt at legislation through last minute speeches on the floor of the Senate is not the proper conduct of the nation's business. Fortunately, as . . . court decisions have indicated, the courts will not abide diminution of the authority of environmental laws through the vehicle of floor speeches re-interpreting clear legislative language."

(118 Cong. Rec. 33711 (1972), 1 *Leg. Hist.* at 204.)

Subsequently, in the House, Representative Dingell criticized all such efforts to make "so-called bootstrap legislative history". (118 Cong. Rec. 37059 (1972), 1 *Leg. Hist.* at 107.)

In a scholarly review and analysis of the Act, Robert V. Zener, who until recently was EPA's General Counsel, remarked that Senator Muskie's statement was of dubious worth, and may have been made because he failed to get agreement on the matter in the Confernce Committee:

"If this statement is authoritative then EPA would be precluded from leaving any discretion at the point of individual permit issuance, whether such a course was technically possible or not. However, as noted, the Conference Report requires only that the effluent limitations within any particular class or category of sources be 'as uniform as possible'. As we have previously discussed, statements of individual conferees that go farther than the Conference Report are dubious indications of congressional [intent], since frequently such statements were made on the floor only because the individual conferee failed to get conference agreement to put the statement in the Report."

(R. Zener, *The Federal Law Of Water Pollution Control*,

in *Federal Environmental Law*, at 703 n.98 (E. Dolgin and T. Guilbert, ed. 1974).)

EPA has backed away from Mr. Zener's statement, and now indeed relies very heavily upon Senator Muskie's summary for the Agency's position.[58] Nonetheless, Mr. Zener's early criticism remains valid.

As the district court in the *Grain Processing* case observed, the statutory language resolves the ostensible conflict in the legislative history. The terms of Section 304(b) expressly require the factors to be applied to individual point sources:

> "Section 304(b) requires EPA to publish regulations providing guidelines for effluent limitations. Section 304(b)(1)(A) requires EPA to [among other things not material] identify 'the degree of effluent reduction attainable . . . *for classes and categories of point sources*'. Section 304(b)(1)(B) requires EPA to 'specify factors to be taken into account in determining the control measures and practices *to be applicable to point sources . . . within such categories or classes*'. (Emphasis supplied.)
>
> "The language is clear. It takes no construction to conclude that (A) applies to classes and categories of point sources and (B) applies to point sources within such categories and classes."
>
> (*Grain Processing Corp.* v. *Train*, 407 F. Supp. 96, 103 (S.D. Iowa 1976), *appeal pending* No. 76-1233 (8th Cir.) (emphasis by the Court).)

A similar difficulty arises respecting the Administrator's consideration of costs in promulgating the 1983-step guideline regulations. Senator Muskie's summary took the position that the Administrator should rely on a technology which could be applied with a reasonable cost, determined "without regard to cost", an obviously inconsistent approach:

> "While cost should be a factor in the Administrator's judgment, no balancing test will be required. The Administrator will be bound by a test of reasonableness. In this case, the reasonableness of what is 'economically achievable' should reflect an evaluation of what needs to be done to move toward the elimination of the discharge of pollutants and what is achievable through the application of technology—without regard to cost."
>
> (118 Cong. Rec. 33696 (1972), 1 *Leg. Hist.* at 170.)

[58] See, *e.g.*, Assistant Administrator Kirk's letter responding to objections to EPA's proposed guidelines regulations for the inorganic chemicals industry at App. 192-195, R. 6500, 6501-6502.

Here also, Mr. Zener considered that "the statements are dubious as indications of congressional intent", since they tried to rewrite the work of the conferees. (R. Zener, *supra*, *Federal Environmental Law*, at 697.)

In short, some statements in the voluminous legislative history of the 1972 Amendments must be taken with a grain of salt. Certain statements do not respect the statutory language agreed by the Conferees, but aim instead at rewriting the language to retrieve positions not accepted by the Conference Committee.

Overall, however, the legislative history supports the statutory framework based upon (a) the objectives and timetables of Section 301, (b) the mandate for guideline regulations in Section 304(b), and (c) the provision in Section 402 for State issuance of permits based upon consideration of the Section 304(b) guidelines.

C. The Guideline Regulations Should Consist Of A Range Of Effluent Values Along With A Specification Of Factors

In *du Pont II* the court of appeals considered whether EPA's bare single-number effluent regulations satisfied the statute. (8 E.R.C. at 1723, App. 265.) The court recognized that other courts, particularly the Third Circuit in *American Iron and Steel Institute* v. *Environmental Protection Agency*, 526 F.2d 1027 (3d Cir. 1975), had ruled that similar regulations were invalid because "they failed to provide meaningful ranges or guidance in considering individual factors." (526 F.2d at

1046.)[59] In *du Pont II* the court of appeals refused to accept that ranges and factors were required, and instead sanctioned EPA's use of single numbers. (8 E.R.C. at 1723, App. 265.) The court opined that ranges may be appropriate for use with some industrial category regulations but decided to defer to the Administrator as to the regulations before it, and to remit the petitioning companies to judicial review proceedings respecting permits for particular plants if they did decide to press the contention. (*Id.*)[60] Respecting the statutory factors specified in Sections 304(b)(1)(B) (1977 step) and 304(b)(2)(B) (1983 step), the court concluded that, notwithstanding the language of this Section, the factors need not be specified and elaborated in the regulations. Rather, the statutory factors were to be used by permit issuers:

> "We construe the congressional intent to be that the specified factors shall be applied by the permit issuer in determining whether the presumptively valid effluent limitations should apply to a particular source of discharge. This construction does not derogate the power of the Administrator to issue general regulations fixing presumptively valid effluent limitations on categories." (8 E.R.C. at 1723, App. 266.)

The court of appeals misread the statute. The statutory language and the legislative history both demonstrate that a

[59] The Third Circuit rejected EPA's argument that the legislative history proved a Congressional intent that all similar plants meet uniform, identical guidelines:

> "[W]hile uniformity was clearly a major congressional concern, some amount of local variations, carefully circumscribed by precise guidelines, was contemplated. In short, *uniformity was to be achieved by effluent standards within a given category which were similar, rather than identical or unitary*." (526 F.2d at 1044 (emphasis added).)

On this issue, the Third Circuit approved of the views expressed by the Eighth Circuit in the *CPC* case. (526 F.2d at 1044 n.38.)

[60] The court of appeals said that "[a] claim of arbitrary action in this regard may be considered in court review under § 509(b)(1)(E) of the issuance or denial of a permit." (8 E.R.C. at 1723, App. 265.) By deferring review, the court of appeals would allow EPA to maintain regulations which do not provide a proper basis for action by permit authorities. Moreover, EPA has taken the position that review of guidelines regulations may not be had in actions to review permits, apparently based on the preclusion clause in Section 509(b)(2).

range[61] and a specification of factors belong in the regulations as the Third Circuit and other courts have ruled.

1. *The statutory language and the legislative history support regulations consisting of a range along with a specification of factors.*

The language of Section 304(b) is explicit. It instructs EPA to identify "amounts of constituents and . . . characteristics of pollutants", and it expressly requires EPA to "specify factors" in the guideline regulations. (§ 304(b)(1)(A) and (B).) Where courts have applied the statutory language, they have rejected EPA's bare single-number regulations. See, *e.g.*, ***American Iron and Steel Institute* v. *Environmental Protection Agency*, 526 F.2d 1027, 1046 (3d Cir. 1975); *Grain Processing Corp.* v. *Train*, 407 F. Supp. 96, 103 (S.D. Iowa 1976), *appeal* pending No. 76-1233 (8th Cir.). See also *supra*, at 37-39.**

The statutory language was not the product of inadvertent congressional action. Congress focussed directly on the prob-

[61] Exceptional circumstances relating to plants in a particular category could justify use of a single number in a guideline regulation, provided that the flexibility Congress sought could nonetheless be achieved by application of the factors, as elaborated in the regulations, in fixing the limitations in a permit for a particular plant. Such circumstances might arise where the industry is comprised of a limited number of plants, all located in the same general area of the country and all of which used the same process configuration and raw material.

Another instance may arise where the plants in a specific category had and have no discharge of waste water (*e.g.*, the guideline regulations for the "Normal Rice Milling Subcategory", 40 C.F.R. §§ 406.50-406.53).

The complexities inherent in such single number regulations are illustrated by examples from the present case. Regulations required no discharge for several subcategories, *e.g.*, hydrochloric acid, 40 C.F.R. §§ 415.72 and 415.73, and sulfuric acid, 40 C.F.R. § 415.212 and 415.213. In the court of appeals EPA agreed to amend the definition of "process waste water" found at 40 C.F.R. § 401.11(g), Appendix C *infra*, at 5c, to provide for the inevitable discharge in the best run plants from minor leaks and spills, rainfall runoff, discharges associated with shut down and start up, and contamination of once-through cooling water. See *du Pont II*, at App. 271, 273-274, 275, and 282-283. Prior to the time the court of appeals set aside EPA's regulations, the Agency published proposed amendments which would have added a new set of requirements for "non-process waste water" to the several subcategory regulations to deal with rainfall runoff and leaks and spills. See 40 Fed. Reg. 7106-7109 (February 19, 1975). These proposed amendments were never promulgated in final form. Even then, EPA's proposal would have dealt with only a portion of the deficiencies in the regulations.

lem of devising regulations which conformed to the technological objectives of the Act while recognizing the enormous numbers and diversity of existing plants. The Report of the Senate Public Works Committee described how the Administrator should carry out a survey of an industry category to establish appropriate ranges in the regulations. Regarding the 1977 regulations the Committee said:

> "In defining best practicable for any given industrial category, the Committee expects the Administrator to take a number of factors into account. These factors should include the age of the plants, their size and the unit processes involved and the cost of applying such controls. In effect, for any industrial category, *the Committee expects the Administrator to define a range of discharge levels, above a certain base level applicable to all plants within that category.* In applying effluent limitations to any individual plant, the factors cited above should be applied to that specific plant. In no case, however, should any plants be allowed to discharge more pollutants per unit of production than is defined by that base level.
>
> *"The Administrator should establish the range of best practicable levels based upon the average of the best existing performance by plants of various sizes, ages, and unit processes within each industrial category.* It is acknowledged that in those industrial categories where present practices are uniformly inadequate, the Administrator may determine best practicable to require higher levels of control than any currently in place if he determines the technology to achieve those higher levels can be practicably applied." [62]

[62] The reference in the quotation to the "range of discharge levels, above a certain base level applicable to all plants within that category" strongly suggests that the Senate Committee had in mind the regulatory pattern of the guidance documents under the Refuse Act Permit Program. The Senate was familiar with the fact that EPA used the term "base level" in the Permit Program documents to mean a level of treatment which all discharges would be required to meet. See Senate Hearings, at 449 and at 1869, 1873 (Scope of Work provisions in contract for developing a guidance document for organic chemicals). The inorganic chemicals guidance documents fixed a range with a base level to be met by all plants (although the term itself was not used) and provided for more stringent limitations within the range. (App. 9, R. 2552; see *supra*, at 14-15 and 48 n.49.)

> (S. Rep. No. 92-414, 92d Cong., 1st Sess., at 50 (1971), 2 *Leg. Hist.* at 1468 (emphasis added).)

As with the 1977 guidelines, the 1983 regulations were also to be derived after a survey of an industry category, and the regulations were again to be expressed as a range:[63]

> "In making the determination of 'best available' the Committee expects the Administrator to apply the same principles involved in making the determination of best practicable as outlined above, except that rather than the *range* of levels established in reference to the average of the best performers in an industrial category the *range* should at a minimum be referenced to the best performer in any industrial category." (*Id.*) (Emphasis added.)

EPA has clung tenaciously to the position that single-number limitations in regulations conform to the statute. However, EPA in a last-minute addition to the regulations—the new section was never proposed for comment—added a "modification" provision only to the 1977-step regulations. EPA explained that the new addition would provide "flexibility":

> "Thus Congress recognized that some flexibility was necessary in order to take into account the complexity of the industrial world with respect to the practicability of pollution control technology." (39 *Fed. Reg.* at 9615, Appendix B *infra*, at 17b.)

The new "variance" provision was made applicable to all 1977-step regulations in identical terms. It permits a plant, upon a showing that the factors applicable to that plant "are fundamentally different from the factors considered in the establishment of the guidelines" to apply for limitations different from those in the regulations.[64] Upon a finding that fundamentally different factors exist, the permitting officer (EPA or the State) can fix different limitations in a permit, either more or less

[63] See also 118 Cong. Rec. 33696 (1972), 1 *Leg. Hist.* at 169 (statement by Senator Muskie).

[64] See for example 40 C.F.R. § 415.212 (Appendix B *infra*, at 69b) in the regulations relating to sulphuric acid. The use of the terms "guidelines" and "limitations" in the provision is hopelessly confused.

stringent. However, EPA's headquarters in Washington retains control, for any such different limitation must be approved by the Administrator before it becomes effective. EPA provided no guidance as to the criteria for measuring "fundamentally different factors", since the factors "considered in the establishment of the guidelines" are not set out in the regulations as Section 304(b) contemplated. EPA does point to the Development Document as specifying the factors considered. However, in the 3 pages in the Development Document devoted to a discussion of the statutory factors, EPA concludes that all have been accommodated by subcategorization and that none are relevant to individual plant permits. (Ex. R. 5644–5646.) Cf. *Grain Processing Corp.* v. *Train,* 407 F. Supp. 96, 102-103 (S.D. Iowa 1976), *appeal pending* No. 76-1233 (8th Cir.) (rejecting similar declaration for corn wet milling industry).

Those courts which examined and followed the statutory language found the "variance" clause to be an inadequate response to the statutory command in Section 304(b) that factors be specified in the regulations.[65] *American Iron and Steel Institute* v. *Environmental Protection Agency,* 526 F.2d 1027, 1046 (3d Cir. 1976); cf. *Grain Processing Corp.* v. *Train,* 407 F. Supp. 96, 104 (S.D. Iowa 1976), *appeal pending* No. 76-1233 (8th Cir.). Each such court recognized that at least some of the statutory factors have applicability only to individual plants and could not be reflected in regulations. *E.g., Grain Processing Corp.* v. *Train, supra,* 407 F. Supp. at 103-104. See also *E. I. du Pont de Nemours & Co.* v. *Train,* __F.2d__, 8 E.R.C. 1718, 1723 (4th Cir. 1976), App. 264. In *du Pont II,* the compromise

[65] The Second Circuit upheld the "variance" clause against a charge by an "environmentalist" group that the statute contemplates no deviation from limitations fixed in the regulations except in a new regulatory proceeding or by reason of an amendment to the Act. *Natural Resources Defense Council Inc.* v. *Environmental Protection Agency,* __ F.2d __, 8 E.R.C. 1988 (2d Cir. 1976). The Court held that a provision for variances was "peculiarly" appropriate in the context of the Federal Water Pollution Control Act because the deadline restricted EPA's sampling of plants and the regulations may well prove "ill-suited" to some unsampled plants. (8 E.R.C. at 1991-1992.) The Court, however, specifically refused to determine whether the "variance" clause will in the future be interpreted with sufficient liberality to accommodate "all legitimate demands for flexibility." (*Id.*)

adopted by the court of appeals at least moves part way toward implementing the statute. The court "construe[d] the Congressional intent to be that *the specified factors shall be applied by the permit issuer* in determining whether the presumptively valid effluent limitations should apply to a particular source of discharge." (8 E.R.C. at 1723, App. 266 (emphasis added).) The court of appeals, however, need not and should not have compromised the statutory language.

2. *The record in these cases and the experience with other industrial categories has verified the decision of Congress to require a range and a specification of factors.*

The wisdom underlying the Congressional selection of the appropriate regulatory pattern for the widely diverse existing plants is illustrated by the present case. EPA reported that in 1971 there were over 900 plants producing the 22 products covered by the inorganics regulations. (Ex. R. 5595.) Data from 80 plants were studied by the contractor; 60 plants were visited for initial screening and 28 plants were selected to be sampled by the contractor. (Ex. R. 5592.) Thus, instead of regulations based on a wide survey of the industrial plants and a range in the regulations based on these data, EPA selected one or two plants denominated "exemplary" in some cases and fixed single-number limitations based on the performance of those plants. In the eleven manufacturing subcategories in which the regulations were attacked and set aside by the Court below, with one exception EPA relied on data from one plant. (Ex. R. 5687 (hydrofluoric acid), 5899 (diaphram chlorine-alkali), 5900 (hydrochloric acid), 5901 (hydrogen peroxide–organic process), 5902 (hydrogen peroxide–electrolytic process, and nitric acid), 5905 (sodium carbonate), 5707 (sodium dichromate), 5908 (sodium silicate), 5909 (sulfuric acid), 5910 (titanium dioxide).) In the mercury cell chlorine-alkali subcategory (comprising 63 plants in the United States), EPA relied upon data from three plants (one in Canada). (Ex. R. 5900.)[66]

[66] The plants relied on by EPA were labelled "exemplary" in four instances, Ex. R. 5683, 5687 (subsequently the data from this plant were shown to be in error, see 40 *Fed. Reg.* 1712 (January 9, 1975)), 5900, 5725.

The legislative history shows that the starting point Congress contemplated

EPA's discussion and rejection of the statutory factors set out in Section 304(b) occupies three pages in the Development Document. (Ex. R. 5644-5646.) The superficiality of EPA's refusal to specify the factors is illustrated by EPA's acknowledgement, in the course of its treatment of the factors, that geography had an impact on the feasibility of various treatment alternatives, *e.g.*, EPA said evaporation ponds are functional only where evaporation exceeds rainfall. (Ex R. 5646.) Nonetheless, EPA adopted uniform requirements for ponds which permit overflow only in catastrophic rains, which the Court below correctly pointed out requires in a net-rainfall area an "infinitely expanding pond to contain all the rainfall." (8 E.R.C. at 1726, App. 272.) This is but one illustration of the consequences of the application of single-number limitations in mechanical style to plants in different situations.

Other examples abound. In *FMC Corp.* v. *Train*, __ F.2d __, 8 E.R.C. 1731 (4th Cir. 1976), the Fourth Circuit set aside and remanded EPA's effluent regulations for the plastic and synthetic materials industry. In part, the court based its decision upon EPA's failure to account for diverse wastewater flows found among plants in a given product subcategory:

> "Given these observations [data collected and analyzed by EPA's contractor], petitioners contend that EPA was arbitrary in selecting a single hydraulic flow from a wide range of flows and then applying this level of water usage uniformly throughout a subcategory.
>
> "The ranges in hydraulic flows found among plants in the subcategories bear witness to the contractor's conclusion that there is no uniform water usage per unit of product manufactured. The following are a few examples.

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for the guidelines is industry-wide performance within the relevant industry subcategory. See *supra* at 66-67. The only exception was for "those industrial categories where present practices are uniformly inadequate . . ." (S. Rep. 92-414, 92nd Cong., 1st Sess. at 50 (1971), 2 Leg. Hist. at 1268.) Thus Congress contemplated a survey of at least a representative sampling, not reliance on a single plant, unless a determination from a survey demonstrated that performance of existing plants was "uniformly inadequate." EPA made no finding as to any of the eleven subcategories that the treatment by the plants in the subcategory was "uniformly inadequate."

> In the polyvinyl chloride subcategory: demonstrated wastewater flow is 1,800 gallons per 1,000 pounds of product, range is 300-5,000 gallons. For celluose acetate (resin): demonstrated wastewater flow is 5,000 gallons per 1,000 pounds of product, range is 2,000 to 20,000 gallons. For rayon: demonstrated wastewater flow is 16,000 gallons per 1,000 pounds of product, range is 4,000 to 23,000 gallons.
>
> "EPA in its brief admits that substantial questions have been raised concerning the hydraulic flow chosen for 1977 in the acrylics subcategory. We think there are substantial questions in the other categories as well and direct EPA to re-examine its use of uniform hydraulic flows for purposes of calculating the regulations in this industry."
>
> (8 E.R.C. at 1736 (footnote omitted).)

Similarly, for the corn wet milling industry, the reviewing court set aside the effluent guidelines because EPA's single-number regulations did not and could not reflect that industry's diversity:

> "There is evidence the quality of the waste water varies with the particular product that is being produced. Highly modified starches result in higher waste loads per unit of raw material. EPA recognized this fact but could not, on the available data, distinguish a 'relationship between the raw waste characteristics from all the mills and their product mix . . .'. Id. at 111. Individual plants vary in the percentage of highly modified starches produced and in each plant the product produced varies from day to day.
>
> "It is thus clear that the EPA recognizes that each plant in the corn wet milling industry is unique and that the application of identical technology will not lead to similar results. Although the EPA recognizes that corn wet mills deserve special consideration, it has not formulated a detailed approach for issuing individual permits. This decision to omit a detailed methodology is an arbitrary and capricious one."
>
> (*Grain Processing Corp.* v. *Train*, 407 F.Supp. 96, 104 (S.D. Iowa 1976), appeal pending No. 76-1233 (8th Cir.).)

EPA's insistence on bare single-number effluent regulations has caused substantial dislocations in the permit-issuing process

and has hampered and delayed administration of the Act. The court in the *Grain Processing* case described the difficulties:

> "*From the point of view of a permit-issuer, the EPA approach is wholly unsatisfactory.* For the most part, the permit issuing authority will be working with no clearly defined methodology in determining the application of the appropriate technology for each plant. *The state agencies, subject to EPA approval, are to play an important role in cleaning the nation's waterways. But the product of the EPA does not allow the states to fulfill that role.* The EPA's efforts have been almost solely directed at arriving at single-number guideline regulations. *Application of these numerical values to each corn wet mill reduces the state agencies to mere conduits.* If the Congress had desired to make the permit issuing function only EPA's concern, it could have done so. But the Congress did not take this course. It set up a carefully defined program with responsibilities to the states. Section 101(b)." (*Id.*, 407 F.Supp. at 104-105 (emphasis added).)

In September 1973 the Effluent Standards and Water Quality Advisory Committee ("ESQUIAC"), the scientific advisory board established by Congress in Section 515 of the Act to review proposed regulations and provide advice to EPA, prepared a report to the Administrator evaluating EPA's procedures (App. 181-187, R. 6472-6491). The report concluded:

> "*The Committee has found the current procedures for establishing effluent limitation guidelines* for point source industrial discharges *to be un-scientific* in their disregard of the following items and/or variables:
>
> 1. Little consideration has been given to the erroneous and/or incomplete data on which many of the initial draft contractors' reports were based.
>
> 2. Little consideration has been given to great differences in individual facilities among generic industries with regards to RAW WASTE LOAD: SIZE OF PLANT: AGE AND TYPE OF PROCESS EQUIPMENT NOW OPERATING IN A GIVEN PLANT: CLIMATE AND GEOGRAPHIC LOCATION FACTORS.

> . . . .
>
> 4. ECONOMIC EQUITY has been disregarded with respect to instructions in Sect. 304(b) involving cost of application of practical and available technology, particularly as these relate to SMALL PLANTS within generic industries.
>
> 5. SPECIFIC EXAMPLES where these items have not been given adequate consideration are to be found in the following studies and published proposed limitations:
>
> | | |
> |---|---|
> | SEAFOOD PROCESSING | PLASTICS AND SYNTHETICS |
> | INORGANIC CHEMICALS | CEMENT |
> | FRUITS AND VEGETABLES | MEAT PACKING |
> | STEAM ELECTRIC POWER | IRON AND STEEL |
>
> (Others not cited here)
>
> 6. Little consideration for some industrial sectors has been given to utility of the guidelines to actual permit conditions in regions." (App. 181-182, R. 6472-6473 (emphasis added).)

The Committee's report proposed a method of developing guidelines, commonly referred to as the Matrix Method, which would have provided a means for considering factors at the time of permit issuance.

EPA disregarded not only the clear command in the statute that it establish a procedure or method in regulations under Section 304 to assure that the technological goals of the statute be achieved, but also to assure that the wide range of differences in individual plants was taken into account by the permit authorities within the limits or range fixed in the regulations. ESQUIAC's call on scientific grounds for EPA to comply with the statute also went unheeded.

D. EPA's Present Assertions Are Not Entitled To Any Special Deference From This Court

Courts have said that an administrative construction of a statute, and more particularly, a contemporaneous construc-

tion, by the agency charged with the duty of applying it is entitled to respect. *Norwegian Nitrogen Products Co.* v. *United States*, 288 U.S. 294, 315 (1933); *United States* v. *Shreveport Grain & Elevator Co.*, 287 U.S. 77, 84 (1932); *United States* v. *Philbrick*, 120 U.S. 52, 59 (1887); cf. *Stuart* v. *Laird*, 1 Cranch [5 U.S] 299, 309 (1803) ("the question is at rest, and ought not now to be disturbed"). However, this judicial deference or respect does not apply to a construction of a statute which represents a turnabout from an original contemporaneous construction. *Fribourg Navigation Co.* v. *Commissioner*, 383 U.S. 272, 279-80 (1966); *United States* v. *Leslie Salt Co.*, 350 U.S. 383, 396 (1956); *cf. Train* v. *Colorado Public Interest Research Group, Inc.*, __ U.S. __, 44 U.S.L.W. 4717, 4719 n. 8 (U.S. June 1, 1976).

At the time the 1972 Amendments were being enacted, EPA was engaged in an effort to develop guidance documents for 20 or more industrial categories. See *supra*, at 14 n.20. The range of effluent values set out in these guidance documents was premised upon application of "best practicable technology", which the 1972 Amendments adopted as the technological objective both to be reflected in the 1977-step guideline regulations under Section 304(b) and to be achieved by point sources by July 1, 1977 under Section 301. EPA initially sought to convert these guidance documents into guideline regulations.

Gradually, from mid-1973 through the early months of 1974, EPA shifted focus from guideline regulations, first to "nationally uniform" rules,[67] and then to "effluent limitations guidelines" which actually were (and are) effluent limitations regulations. See *supra*, at 19-22, and 59-60.

EPA's change in position constitutes an "unwarranted volte-face" from its earlier contemporaneous construction of the Act. *Fribourg Navigation Co.* v. *Commissioner*, 383 U.S. 272, 279 (1966). This situation is very similar to that presented in *United States* v. *Leslie Salt Co.*, 350 U.S. 383 (1956). In that case, the Court rejected a "more recent *ad hoc* contention as

[67] See former Assistant Administrator Kirk's letter responding to comments, (App. 193, R. 6501), and the discussion *supra* at 19.

to how the statute should be construed", saying: "*There are persuasive reasons for construing* 'debentures' and 'certificates of indebtedness' *in accordance with the Treasury's original interpretation of those terms* in this statute's altogether comparable predecessors." (*Id.* at 396 (emphasis added).) Accord, *Fribourg Navigation Co.* v. *Commissioner*, 383 U.S. 272, 279-80 (1966).

Previously, EPA has relied upon *Train* v. *Natural Resources Defense Council*, 421 U.S. 60, 87 (1975), to suggest that deference be accorded to its asserted position. Such reliance is misplaced. The Court in that case carefully examined a truly contemporaneous construction by EPA of Section 110 of the Clean Air Act and adopted that construction upon the ground that the construction was firmly rooted in the words of the statute. The Court rejected alternative interpretations by a number of courts of appeals which had relied in some instances on "Solomonesque" judgments not tied to any specific statutory language. (421 U.S. at 73.). Here the shoe is on the other foot. Petitioners, not EPA, support the Agency's own original and contemporaneous construction of the Act grounded in the statutory language.

E. Because The Act Was Structured To Accommodate Guideline Regulations Under Section 304(b), To Force-Fit Promulgation Of Limitations By Regulation On The Statutory Scheme Would Have Adverse Collateral Consequences

Various sections of the Act depend upon or tangentially relate to the promulgation of effluent regulations for existing plants. These statutory cross-references and interdependent provisions were structured to accommodate guideline regulations under Section 304(b), not limitation regulations under Section 301. To force-fit promulgation of limitations by regulation onto the statutory scheme would create a series of adverse collateral consequences. The difficulties in accommodating EPA's present contentions to the Act confirm that the Agency's present position misreads the Act's provisions.

1. *Section 515 expressly calls for Advisory Committee review of regulations under Section 304(b), not Section 301.*

Section 515 of the Act, 33 U.S.C. § 1374, establishes an Effluent Standard And Water Quality Information Advisory Committee made up of distinguished scientists "to provide, assess, and evaluate scientific and technical information on effluent standards and limitations". (§ 515(a)(2).) To enable the Committee to perform its function EPA is required to advise the Committee of the Agency's intent to publish regulations. Section 515 specifically refers to regulations under Sections 304, 306, and 307. There is no reference to Section 301. (See § 515(b)(1).) There is not the slightest evidence that Congress foresaw or intended that EPA would issue regulations and claim that they were Section 301 regulations. Congress would specifically have provided for review by the Committee of regulations under Section 301 had it intended such regulations to be issued.

2. *The provisions for periodic review by EPA contemplate guideline regulations.*

After promulgation of the guideline regulations, Section 304(b) requires the Administrator "at least annually thereafter, [to] revise, if appropriate, such regulations". In contrast, subsection 301(d) provides for review of effluent limitations every five years:

> "(d) Any effluent limitations *required by paragraph (2) of subsection (b)* of this section shall be reviewed at least every five years and, if appropriate, revised *pursuant to the procedure established under such paragraph.*"
>
> (§ 301(d) (emphasis added).)

The only "procedure" established by paragraph (2) of subsection (b) is the provision that effluent limitations for 1983 shall require the application of best available technology economically achievable "as determined in accordance *with regulations issued by the Administrator pursuant to section 304 (b) (2)* of this Act. . . ." (§ 301(b)(2)(A) (emphasis added).) Thus, the "procedure" to which subsection (d) refers is the promulgation of regulations under Section 304(b).

This becomes all the more apparent in considering the purpose of Sections 301(d) and 304(b). The purpose of subsection (d), as the Senate Report explained, was to provide for the program after 1981 (1983 in the final bill). Thus, the Senate Committee's Report said (with reference to Section 301 (c), which became 301(d) in the final bill):

> "The Committee has established a procedure to continue the program beyond 1981 [1983 in the final bill]. Under this provision, the procedures and requirements of Phase II would be repeated every five years for those sources of pollution which would not have to achieve the no discharge requirement in Phase I (if required to meet water quality standards) or Phase II, or in an earlier five-year phase."
>
> (S. Rep. No. 92-414, 92d Cong., 1st Sess., at 46 (1971), 2 *Leg. Hist.* at 1464.)

The five-year period thus was selected in part because the Senate bill, S. 2770, had provided for the best practicable standard to be achieved by 1976 and the best available standard to be achieved by 1981—a five-year interval. (S. 2770, 92d Cong., 1st Sess. (1971), 2 *Leg. Hist.* at 1608-1610.) More importantly, a permit issued under Section 402 ordinarily has a five-year term. (§§ 402(a)(3), 402(b)(1)(B).) Thus, Section 301 (d) was designed to mesh with the direction to the Administrator to issue a new round of permits on a five-year cycle after 1983. On the other hand, the Administrator was to review and update the guideline regulations under Section 304(b) on an annual basis.

These provisions for periodic review do not make sense if regulations are to be issued under Section 301 as well as Section 304. The Fourth Circuit had trouble with the review provisions as a result of its compromise position that EPA could issue "presumptively applicable" limitation regulations. In a decision announced on the same day as *du Pont II* was decided, the Fourth Circuit opted for annual review of limitation regulations, on the ground that it was "appropriate":

> "Section 304(b) provides that § 304 guidelines be revised, if appropriate, at least annually, and § 301(d) has

a similar requirement for § 301 limitations at five-year intervals. Since the Administrator asserts that these regulations are "effluent limitations guidelines" satisfying both § 301 and § 304, . . . this Court feels that an annual revision is appropriate."

(*Tanners' Council of America, Inc.* v. *Train*, __F.2d__, 8 E.R.C. 1881, 1886 n.16 (4th Cir. 1976).)

The Fourth Circuit need not have made such an arbitrary choice if it had followed the statute's prescription for guideline regulations.

3. *Unlike new source standards issued pursuant to Section 306 or pretreatment standards issued under Section 307(b) and (c), "effluent limitations" are not enforceable independently of permits.*

Section 309 of the Act, 33 U.S.C. § 1319, prescribes enforcement mechanisms and remedies to deal with violations of the Act. Sections 309(a)(3), (c), and (d) all proscribe violations of "section 301 . . . or . . . any permit condition or limitation". If the reference to a violation of Section 301 contemplated limitation regulations, it would duplicate the reference to violations of permit conditions. (EPA argues that its limitation regulations must be mechanically cranked into permits.) However, as the Eighth Circuit pointed out, "[Section] 301(a) prohibits discharging *without* a permit, and it is to that conduct which § 309 is addressed." *CPC International Inc.* v. *Train*, 515 F.2d 1032, 1043 (8th Cir. 1975) (emphasis by the Court).[68]

Also, in direct contrast to the effluent guideline regulations, the new source standards issued pursuant to Section 306 and the pretreatment standards issued under Section 307(b) and (c) are independently enforceable. (See §§ 306(e), and 307(d), and *supra*, at 8-9.) There is no comparable provision making it unlawful to fail to comply with effluent regulations for existing

[68] In addition, Section 301(f) makes it "unlawful to discharge any radiological, chemical, or biological warfare agent or high-level radioactive waste into the navigable waters."

sources. Enforceable "limitations", as the term is used in Section 309, arise only in permits.[69]

4. *The citizen-suit provision, Section 505, does not contemplate limitation regulations.*

Section 505 of the Act, 33 U.S.C. § 1365, authorizes private citizens to bring civil actions in Federal district courts to seek injunctions enforcing certain of the Act's provisions. Such an action can be brought against any person "who is alleged to be in violation of (A) an effluent standard or limitation under this Act or (B) an order issued by the Administrator or a State with respect to such a standard or limitation. . . ." (§ 505(a)(1).) Section 505 specially defines "effluent standard or limitation under this Act" as:

> "(1) effective July 1, 1973, an unlawful act under subsection (a) of section 301 of this Act; (2) an effluent limitation or other limitation under section 301 or 302 of the Act; . . . or (6) a permit or condition thereof issued under section 402 of this Act. . . ." (§ 505(f).)

Each segment of this definition covers a different matter, and the definition does not contemplate EPA limitation regulations.

[69] Furthermore, Section 402(k) expressly provides that compliance with a permit condition will be deemed to be compliance with the requirements of Section 301 and other sections.

Section 402(k) also has an important bearing on the new source standards, especially respecting the role of the new source standards in the permit process. See the opening brief in Nos. 74-1473 and 75-1705, at 6-9.

Putting aside Section 402(k), a massive new criminal code would be generated by inference if this Court were to find an authorization to issue limitations by regulation under Section 301, and then to consider that such limitation regulations were independently enforceable. Canons of statutory construction dictate that Congress define criminal conduct clearly, and that criminal statutes be construed narrowly:

> "'When choice has to be made between two readings of what conduct Congress has made a crime, it is appropriate, before we choose the harsher alternative, to require that Congress should have spoken in language that is clear and definite. We should not derive criminal outlawry from some ambiguous implication.' *United States* v. *Universal Corp.*, 344 U.S. 218, 221-222 (1952)." (*Toussie* v. *United States*, 397 U.S. 112, 122 (1970).)

Section 505(f)(1) refers to the Section 301(a) prohibition on making any discharge without a permit. Paragraph 505(f)(2) covers three separate matters. First, it encompasses the prohibition in Section 301(f) against discharges of radiological, chemical, and biological warfare agents and high-level radioactive wastes. Second, it covers the limitations fixed by the Administrator for an individual point source pursuant to Section 301(c), relating to modification of the 1983-step requirements for economic reasons. And third, it also bears on the "water quality related effluent limitations" issued by order by the Administrator under Section 302 for an individual "point source or group of point sources" (§ 302(a)), after specially prescribed hearings have been had and certain findings have been made. (§ 302(b).)[70] Paragraph 505(f)(6) relates to the limitations in a permit.[71]

5. *Congress did not intend to require review now of the 1983-step regulations, and premature review actions would have to be brought if limitations are to be promulgated by regulation.*

In *du Pont II* the court of appeals objected to the circumstance that it had before it challenges to regulations applicable far in the future. The guideline petitions sought review of, among other things, 1983-step regulations which governed

[70] The Senate Report respecting the 1972 Amendments states that the "limitations" authorized under Section 302 are to be established on a "case-by-case" basis, and not by regulation:

> "The Committee has included language in this section requiring that *in the determination of effluent limitations based* on water quality, consideration must be given, *on a case-by-case basis,* to a balancing of the economic and social costs against the social and economic benefits sought to be obtained."

(S. Rep. No. 92-414, 92d Cong., 1st Sess., at 47 (1971), 2 *Leg. Hist.* at 1465 (emphasis added).)

[71] This construction of Section 505(f) accords with the interpretation of the Sections made by the Eighth Circuit in *CPC International Inc.* v. *Train,* 515 F.2d 1032, 1043 (8th Cir. 1975). Compare the different interpretation found in *American Meat Institute* v. *Environmental Protection Agency,* 526 F.2d 442, 451 (7th Cir. 1975), and *American Frozen Food Institute* v. *Train,* ___ U.S. App. D.C. ___, ___ F.2d ___, 8 E.R.C. 1993, 2006 n.5 (1976).

effluent levels to be achieved roughly seven years hence. (8 E.R.C. at 1725, App. 268-270.) The court of appeals observed that Section 304(b) required the publication of both 1983-step and 1977-step regulations within one year after enactment of the 1972 Amendment. The petitioning companies then had to seek review within 90 days after issuance of the regulations, if the special review provisions of Section 509(b)(1) were applicable. (*Id.*) Section 509(b)(1) provides that

> "Review of the Administrator's action . . . (E) in approving or promulgating any effluent limitation or other limitation under sections 301, 302, or 306 . . . may be had by any interested person in the Circuit Court of Appeals of the United States for the Federal judicial district in which such person resides or transacts such business upon application by such person. Any such application shall be made within ninety days. . . ."

In *du Pont II* the court of appeals said it would not "engage in speculation" as to the 1983-step regulations. (8 E.R.C. at 1725, App. 270.) The court set aside 1983-step regulations for production of chlorine, hydrochloric acid, hydrofluoric acid, hydrogen peroxide, nitric acid, sodium carbonate, sodium dichromate, sodium metal, sodium silicate, sulfuric acid, and titanium dioxide. (8 E.R.C. at 1731, App. 284-286.) The court of appeals in each instance found no support in the record for EPA's regulations.

In contrast, in a case decided the same day, *Tanners' Council of America, Inc.* v. *Train,* ___F.2d___, 8 E.R.C. 1881 (4th Cir. 1976), the court of appeals refused to remand to EPA the 1983-step leather tanning effluent regulations there before it. The court viewed review as "premature", and offered the advice that review could be obtained later under a provision of Section 509(b)(1) authorizing review after the generally applicable 90-day period had passed, where the review application is based solely on grounds arising after the ninetieth day. (8 E.R.C. at 1886-1887.)

The Fourth Circuit obviously was uncomfortable in carrying out review of the 1983-step regulations at this stage, but the

difficulty was of its own making. If the court had required adherence to the statutory pattern of guidelines rather than accepting "presumptively applicable" limitations as a compromise position, it would not necessarily have had to carry out review now of the 1983-step effluent regulations. Congress did not insert Section 509(b)(1)(E) into the Act to provide review of "limitation" regulations, and the "premature" review of the 1983-step regulations is another of the adverse collateral consequences which arises if promulgation of limitations is injected into the statutory scheme by inference.

6. *Section 509 (b) (1) (E) was provided by Congress primarily to provide review of EPA action on State-issued permits, but EPA would give no effect to this intent.*

Congress included Section 509(b)(1)(E) to authorize review in the courts of appeals of EPA action in reviewing the terms of a State-issued permit.[72] Among other things this provision solved for Congress the problem of how federal review could be obtained for a State-issued permit. Congress could, and did, premise federal judicial review upon and provide such review for the one aspect of federal involvement in the otherwise entirely State proceeding.

Section 509(b)(1)(E) speaks of review of the Administrator's action in "approving or promulgating any effluent limitation or other limitation under sections 301, 302, or 306". The Administrator "approves" a limitation when he reviews a State permit under Section 402(d) to determine whether it meets "the guidelines and requirements of this Act" (§ 402(d)(2)),

[72] Section 509(b)(1)(E) also provides for review by the courts of appeals of the Administrator's action in "promulgating" limitations directly by order for a particular point source under Sections 301(c) and 302. The Administrator is authorized and directed by Section 301(c) to set such special limitations, which modify otherwise applicable 1983-step requirements, if certain economically related factual tests are met. Section 302 authorizes the Administrator to establish special "water quality related effluent limitations" for an individual "point source or group of point sources."

and then does not veto the permit.[73] By using the guideline regulations, the State has already set the "effluent limitations" in the permit, within the meaning given effluent limitations in Section 502(11) of the Act.

As a consequence of its argument for limitations regulations, EPA would treat the word "approving" in Section 509(b)(1)(E) as redundant and having no function. In fact, it serves the very important purpose of providing the *only* avenue to obtain judicial review of EPA's determinations in acting on a State-issued permit. Section 509(b)(1)(F) authorizes review by a court of appeals of EPA's action "in issuing or denying any permit under section 402", but the type of action on a permit described in subparagraph (F) arises only when EPA's regional offices themselves constitute the permit authority, rather than the States. The regional offices have such authority where the pertinent State does not have an approved permit program.

This construction of the "approving" language is confirmed by the references in Section 509(b)(1) to actions respecting new sources under Section 306. Section 509(b) contains two separate provisions pertinent to review of EPA's actions under Section 306, one of which would be without meaning under EPA's presently advocated position. Section 509(b)(1)(A) provides for review of standards of performance issued by EPA under Section 306. Section 509(b)(1)(E) also provides for review of the Administrator's action in "approving or promulgating any effluent limitation or other limitation under sections 301, 302, *or 306*" (emphasis added). The only regula-

[73] Earlier versions of the bill that became the Federal Water Pollution Control Act Amendments of 1972 actually required EPA to take the affirmative step of approving the permit's effluent limitation before the State-proposed permit could become effective. S. 2770 (the bill which ultimately became law) in the form in which it was passed by the Senate provided that: "No permit shall issue until the Administrator is satisfied that the conditions to be imposed by the State meet the requirements of the Act." (S. 2770, § 402(d)(2), 92d Cong., 1st Sess. (1971), 2 *Leg. Hist.* at 1690.) Understandably, at that time the language of Section 509(b) contained the "approving or promulgating" reference (see *id.* at 1713) which it still retains, although in the enacted version of the bill the EPA review function has changed slightly to one of having to make a disapproval. See *supra*, at 51-55, for a discussion of the legislative history underlying this change.

tions to be promulgated under Section 306 are the new source standards, not limitations, and Section 509(b)(1)(A) provides for review of those standards. The only "approval" by the Administrator could be of effluent limitations for a "new source" fixed by a State in a permit in conformity with the new source standards. If Section 509(b)(1)(E) does not refer to such Federal approval of State-initiated and issued limitations for new sources, this Section's reference to Section 306 is meaningless.

A reference to "promulgating" limitations is necessary in Section 509(b)(1)(E) because the Administrator does promulgate limitations by order issued respecting an individual plant under the limited and circumscribed circumstances set out in Section 301(c)[74] and Section 302.[75] These specially set limitations can be important to the particular plant involved, and Congress logically provided for review of the Administrator's action in imposing them.

7. *Summary.*

A variety of provisions in the Act were drafted to accommodate a statutory system in which EPA would promulgate guideline regulations under Section 304(b), and in which either the States or EPA then would set limitations in permits depending upon who had authority in the local area. Superimposing by inference a scheme for promulgating limitations by regulation does violence to the pattern of the Act. Some provisions are made redundant or rendered purposeless. Section 515 and parts of Sections 309, 505, and 509 are in this category. Others are infused with new meaning which radically transforms their effect to the detriment of sound administration of the Act. Parts of Sections 309, 505, and 509 would be so affected.

The fact that these unintended adverse effects would occur if EPA were to prevail demonstrates that this Court should

[74] The "limitations" issued by order under Section 301(c) pertain to cases where the otherwise applicable 1983-step requirements have been modified for economic reasons. See *supra*, at 83 n.73.

[75] The "limitations" set pursuant to Section 302 are more stringent requirements imposed for water quality reasons. See *supra*, at 80 n.70.

adhere to the statutory language and reject EPA's arguments for an inferred power. The interpolation sought to be made is not reasonable in these circumstances.

II.

FEDERAL DISTRICT COURTS, NOT COURTS OF APPEALS, HAVE INITIAL JURISDICTION TO REVIEW EPA'S EFFLUENT REGULATIONS (GUIDELINES) FOR EXISTING PLANTS

In these cases, the jurisdictional issues are but a short tail to a large dog. *I.e.*, the Court necessarily must consider and resolve the important statutory construction issues respecting the nature of EPA's regulations prior to deciding whether initial jurisdiction of an action to review the regulations lies in the district courts, or the courts of appeals, or may be brought in both. *Federal Communications Commission* v. *Columbia Broadcasting System of California, Inc.*, 311 U.S. 132 (1940); *Cheng Fan Kwok* v. *Immigration and Naturalization Service*, 392 U.S. 206 (1968); *cf. National Railroad Passenger Corp.* v. *National Ass'n of Railroad Passengers*, 414 U.S. 453, 456 (1974); *Montana-Dakota Utilities Co.* v. *Northwestern Public Service Co.*, 341 U.S. 246 (1951); *Bell* v. *Hood*, 327 U.S. 678 (1946).

A. Actions For Review Of Guideline Regulations Should Be Brought In Federal District Courts Under The Administrative Procedure Act; The Special Review Provisions Of Section 509(b), Calling For Original Proceedings In The Courts Of Appeals, Do Not Apply

1. *The Act establishes a bifurcated system for review actions.*

The Act contemplates a scheme of bifurcated jurisdiction to review the varied administrative actions taken under its terms. This circumstance is not unusual. See, *e.g.*, *Federal Communications Commission* v. *Columbia Broadcasting System of California, Inc.*, 311 U.S. 132 (1940) (construing the Communications Act of 1934); *Cheng Fan Kwok* v. *Immigra-*

tion and Naturalization Service, 392 U.S. 206 (1968) (construing the Immigration and Nationality Act). In this instance, Congress has provided three separate jurisdictional bases for this bifurcated system.

First, Section 509(b) sets out a series of six expressly specified actions taken by the Administrator which are subject to review on petition in courts of appeals. (§ 509(b)(1)(A)-(F).) Second, Section 505 provides for jurisdiction in district courts over civil actions by private citizens seeking injunctive relief respecting certain specified violations of the Act or of administrative regulations and orders under the Act. (§ 505(a).) Third, district courts have jurisdiction to review all actions taken by agencies and officials other than the EPA and its Administrator, and to review many actions of the Administrator (those not specified in Section 509(b)(1)),[76] based upon Section 10 of the Administrative Procedure Act, now codified as 5 U.S.C. §§ 701-706, upon 28 U.S.C. §§ 1331, 1332, 1337, 1361, and 1651, and upon the Declaratory Judgment Act, 5 U.S.C. § 2201-2202. See *Natural Resources Defense Council, Inc.* v. *Train*, 171 U.S. App. D.C. 151, 154-155, 519 F.2d 287, 290-291 (1975); *CPC International Inc.* v. *Train*, 515 F.2d 1032, 1038 & n.12 (8th Cir. 1975); *cf. Weinberger* v. *Bentex Pharmaceuticals, Inc.*, 412 U.S. 645, 651-653 (1973); *Cheng Fan Kwok* v. *Immigration and Naturalization Service*, 392 U.S. 206, 209-210 (1968); *Oljato Chapter of the Navajo Tribe* v. *Train*, 169 U.S. App. D.C. 195, 204-206, 515 F.2d 654, 663-665 (1975).

The jurisdictional issues before the Court in these cases stem from this bifurcated jurisdictional framework, *i.e.*, which of these jurisdictional routes is the one prescribed by Congress for review of EPA's effluent regulations for existing plants.

2. *Review actions for guideline regulations should be brought in the district courts, not in the courts of appeals.*

Because Section 509(b)(1) authorizes special review in the courts of appeals for certain actions, the Court's inquiry should

[76] Appendix D, *infra* at 1d-5d, contains a sample listing of a number of administrative actions to be taken under the Act by the Administrator which are subject to review under the Administrative Procedure Act.

focus first on the language of that Section. The Administrator's action in promulgating guideline regulations under Section 304(b) is not among the six categories of action specified in Section 509(b)(1)(A)-(F). Moreover, the Section does not mention or refer in any respect to Section 304.

In Section 509(b)(1), Congress provided that "Review of the Administrator's action . . . (E) in approving or promulgating any effluent limitation or other limitation under sections 301, 302, or 306 . . . may be had by any interested person in the Circuit Court of Appeals of the United States for the Federal judicial district in which such person resides or transacts such business. . . ." This provision was written into the Act primarily to authorize review in the federal courts of appeals of EPA action in reviewing the terms of State-issued permits. See *supra*, at 82-84. Such "limitations" in State permits may be for a new source as well as for an existing source, which accounts for the reference to Section 306 in Section 509(b)(1)(E). This jurisdictional clause also serves a secondary purpose in providing review by courts of appeals of the Administrator's action in establishing limitations directly by order for a particular point source under Section 301(c) or under Section 302. See *supra*, at 82 n.72, 84 & nn.74-75. It does not contemplate issuance of limitations by regulation.

As discussed previously, there is no statutory basis for EPA to issue limitation regulations. The Act mandates that EPA issue guideline regulations, and under the jurisdictional framework just described, review of such guideline regulations should be had initially in the district courts under the Administrative Procedure Act and the related generally applicable jurisdiction and venue provisions of the Judicial Code. *CPC International Inc.* v. *Train*, 515 F.2d 1032, 1037-1038 & n.12 (8th Cir. 1975).

The majority of those courts of appeals which have accepted jurisdiction over original review actions have done so on the basis that EPA has an inferred authority to issue limitations regulations, of one type or another, which limitations fall within the ambit of Section 509(b)(1)(E). See *American Iron and Steel Institute* v. *Environmental Protection Agency*, 526

F.2d 1027 (3d Cir. 1975) (jurisdiction implied); *American Meat Institute* v. *Environmental Protection Agency*, 526 F.2d 442 (7th Cir. 1975); *Hooker Chemicals & Plastics Corp.* v. *Train*, __F.2d__, 8 E.R.C. 1961, 1963-1967 (2d Cir. 1976); *American Frozen Food Institute* v. *Train*, __U.S. App. D.C.__, __F.2d__, 8 E.R.C. 1993, 2004 (1976). These decisions rest on the faulty premise that the Administrator was given by Congress an inferred direction to issue limitations by regulation.

3. *Policy considerations do not provide a sound basis for construing Section 509(b) in a strained fashion to encompass guideline-regulation review actions.*

Two courts of appeals have divorced their decision on these jurisdictional issues from the underlying substantive context. In *American Petroleum Institute* v. *Train*, 526 F.2d 1343 (10th Cir. 1975), the Tenth Circuit ruled that jurisdiction initially to entertain review actions to review EPA's effluent regulations was with the courts of appeals, on grounds suggesting that the Administrator's assertions could affect the court's jurisdiction. The court reasoned that the Administrator asserted he had statutory authority to issue limitations and the exercise of such asserted power had jurisdictional consequences. (*Id.*, 526 F.2d at 1345.) The Tenth Circuit explicitly declined to consider "any issue bearing on the statutory power of the Administrator to promulgate effluent limitations on existing sources by regulations or, if the power exists, the manner in which it is to be exercised." (*Id.*, 526 F.2d at 1346.) This approach is surely wrong. An assertion of authority by the head of an administrative agency, standing alone, cannot confer jurisdiction on one court and oust another. *Cf. Cheng Fan Kwok* v. *Immigration and Naturalization Service*, 392 U.S. 206, 210 & n.9 (1968). The pertinent court must conduct an independent examination of its jurisdiction, including in a case such as this the substantive context to which the jurisdictional provisions relate and upon which they depend. See *Federal Communications Commission* v. *Columbia Broadcasting System of California, Inc.*, 311 U.S. 132, 135-138 (1940); cf. *Whitney National Bank* v. *Bank of New Orleans*, 379 U.S. 411, 419-423 (1965).

In a somewhat similar vein, the Fourth Circuit in *du Pont I* ruled that it had jurisdiction under Section 509(b) to review EPA's effluent regulations even if they were guideline regulations under Section 304(b) and not limitation regulations under Section 301. Judge Widener's opinion for the court of appeals considered that the guideline regulations would be necessary precursors to limitations in permits and thus that any reference in Section 509(b) to limitations under Section 301 must also encompass the guideline regulations:

> "*Even if* § *301 merely sets out the technological objectives to be attained under the Act, courts of appeals may properly assume jurisdiction to review actions of the Administrator in issuing regulations to achieve these objectives.* If § 301 is to be viewed in the manner advocated by the appellants, then § 304(b) must necessarily be deemed the key to the attainment of the objectives set forth in § 301. Thus, to obey the mandate of § 301, 'guidelines for effluent limitations' must be promulgated under § 304(b). Construed in this light, *any action taken by the Administrator under* § *304 (b) should properly be considered to be pursuant to the provisions of* § *301 and, therefore, reviewable by this court under* § *509.*"
>
> (528 F.2d at 1142, App. 250 (emphasis added).)

For these results, the court of appeals relied heavily upon "[t]he practical difficulties" of a determination that review of guideline regulations was initially in the district courts. (528 F.2d at 1141 n.5, App. 249.) The court noted that review of the EPA's issuance of standards for new plants was unquestionably in the courts of appeals under Section 509(b)(1)(A). District court review of guideline regulations would thus result in a bifurcation of review between the two courts. (*Id.* at 1141, App. 249.) The court of appeals considered Congress had not affirmately expressed a desire for such a result, and concluded that Congress had not intended it. (*Id.*)

Judge Widener's approach to jurisdiction in *du Pont I* has considerable surface appeal. It allowed the court to avoid a ruling which sanctioned EPA's assertion that the Agency was authorized by implication to issue limitation regulations which

overrode the guideline regulations which the statute explicitly required be issued. At the same time, the court was able to preserve a series of review actions before it involving a considerable number of technical questions in which both the court and the parties had invested substantial time and effort. The court would consider many of the same technical arguments in any event in passing on EPA's new source standards for the same product subcategories involved in the existing-source guideline review actions.

Nonetheless, the "practical" considerations upon which the court of appeals relied so heavily in *du Pont I* should have a relatively limited role in construing the jurisdictional provisions of a statute. To their detriment, parties not before the court may have acted, or have failed to act, in reliance upon the ostensible meaning of a jurisdictional provision. As Mr. Justice Frankfurter put the matter, "in construing a definite procedural provision we do well to stick close to the text and not import argumentative qualifications from broad, unexpressed claims of policy." *Utah Junk Co.* v. *Porter*, 328 U.S. 39, 44 (1946). See also *Cheng Fan Kwok* v. *Immigration and Naturalization Service*, 392 U.S. 206 (1968); *Federal Communications Commission* v. *Columbia Broadcasting System of California, Inc.*, 311 U.S. 132, 135-138 (1940). Overall, the Court should strive to provide "[a] sensible reading of the jurisdictional provisions in the context of the substantive provisions to which they relate. . . ." *Federal Communications Commission* v. *Columbia Broadcasting System of California, Inc., supra*, 311 U.S. at 136.

The jurisdictional provisions in Section 509 have already caused considerable difficulty in a variety of factual situations, and a number of would-be litigants have discovered that they were in the wrong court.[77] The present situation would only be exacerbated by construing the Section to encompass administrative actions not "sensibly" read as being within one of the six categories specified by the Section's language.

[77] After a spate of such rulings, one commentator described the Act's jurisdictional provisions as "inscrutable":

"A group of landowners downstream from a newly built sewage treatment plant learned a little about the inscrutable Federal Water Pollution Control Act as a federal district court ruled that the group's challenge to the plant's NPDES permit must be brought in the U.S. Court of Appeals. This marks the fourth time in recent months that a district or circuit court has ruled that the other court has jurisdiction to review EPA action taken under the Water Act."

CCH, *Pollution Control Guide, Newsletter*, at 304 (June 10, 1975).

The four cases were *Sun Enterprises, Ltd.* v. *Train*, 394 F. Supp. 211 (S.D.N.Y. 1975); *CPC International Inc.* v. *Train*, 515 F.2d 1032 (8th Cir. 1975); *American Paper Institute* v. *Train*, 381 F. Supp. 553 (D.D.C. 1974); and the district court's decision in the present case.

In addition, the court of appeals in *du Pont I* was in error in evaluating one of the "practical difficulties" it said occurred with a straightforward reading of the Section. The court assumed that the new source standards would be issued at the same time and on the same record as the effluent guideline regulations. The court considered that it would be anomolous if review of the new source standards were in the court of appeals while review of the guideline regulations took place in the district court. (See 528 F.2d at 1141, App. 249.)

As the record shows in these cases, concurrent promulgation of both types of regulations was in fact what happened. But the Act itself did not contemplate simultaneous issuance of these two separate types of rules; the concurrent rulemaking effort was a product of EPA's internal policies. The Act mandated that EPA issue the guideline regulations under Section 304(b) within one year after enactment of the 1972 Amendments. (§ 304(b); see *supra* at 11.) In contrast, Section 306 gave EPA one year and seven months to develop and promulgate new source standards for this industry and for the other industries listed in Section 306(b)(1)(A). (See §§ 306(b)(1)(A) and 306(b)(1)(B).)[78] Under the timing prescribed in the Act, bifurcated review of the standards for new sources and the guideline regulations for existing sources does not cause the practical problem to which the court of appeals referred. Separate records would have been involved

[78] Periodic review of the regulations may also proceed on a different schedule. Section 304(b) calls for annual review of guideline regulations, while Section 306(b)(1)(A) provides that new source standards may be reviewed and revised "from time to time."

and indeed the two types of rules would have had entirely separate purposes.

4. *Section 509(b) contains harsh preclusion and limitation clauses and should not be construed expansively.*

The court of appeals also failed to consider countervailing practical difficulties arising from its decision. For example, Section 509(b)(2) forbids in enforcement actions the raising of a defense that regulations are invalid if review could have been had under Section 509(b)(1):

> "(2) Action of the Administrator with respect to which review could have been obtained under paragraph (1) of this subsection shall not be subject to judicial review in any civil or criminal proceeding for enforcement."

Moreover, Section 509(b)(1) ordinarily allows review only if a petition is filed within 90 days after the Administrator's action:

> "Any such application [for review in the court of appeals] shall be made within ninety days from the date of such determination, approval, promulgation, issuance or denial, or after such date only if such application is based solely on grounds which arose after such ninetieth day."

These are harsh measures under any circumstances.[79] They are especially harsh for litigants who, upon reading the special

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[79] The preclusion clause in Section 509(b)(2) is akin to a provision contained in the Emergency Price Control Act of 1942, which in *Yakus* v. *United States*, 321 U.S. 414 (1944), was upheld against a claim that it contravened guarantees provided by the Fifth and Seventh Amendments to the Constitution. Subsequent to the *Yakus* decision the Emergency Price Control Act was amended to ameliorate the effect of the preclusion clause. See Act of June 30, 1944, C. 325, Title I, § 107, 58 Stat. 639, amending 50 U.S.C.A. App. § 924.

Difficulty arises with the application of the time-limitation provision to guideline-regulations review actions because Section 509(b) on its face does not appear to apply to the Section 304(b) guideline regulations. Also, if Section 509(b) is construed to govern review of the existing-plant regulations, the 1983-step regulations may be reviewed "prematurely." *FMC Corp.* v. *Train*, ___ F.2d ___, 8 E.R.C. 1731, 1740 (4th Cir. 1976); *Tanners' Council of America, Inc.* v. *Train*, ___ F.2d ___, 8 E.R.C. 1881, 1886-1887 (4th Cir. 1976). See *supra*, at 80-82.

review provisions which did not mention regulations under Section 304(b), could not fairly conclude that the special review provisions applied to guideline regulations issued under Section 304.

Various pragmatic reasons for assigning review of informal rulemaking action to one court or another have been thoroughly discussed recently by both judges and commentators.[80] The discussion of such policy factors has, however, largely been confined to a consideration of reasons for Congress to write legislation in one fashion or another. In contrast, here the court of appeals considered such policy factors in reaching its decision, which in effect operates retroactively to deprive unsuspecting persons or groups of any review, given the aforementioned restrictions present in paragraphs 509(b)(1) and (2).

While the policy questions concerning the appropriate forum for review are quite important in a legislative context, they must have a restricted role in this case. The policy arguments should be made to Congress. See *Radzanower* v. *Touche, Ross & Co.*, ___ U.S. ___, 44 U.S.L.W. 4762, 4764 n. 12 (U.S. June 7, 1976). Congress, not the courts, decides the forum for review.[81] Construed fairly and sensibly, Section 509(b) does not govern or prescribe the forum for actions to review guideline regulations.

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[80] *E.g.*, Judge Clark of the Fifth Circuit, writing in concurrence to that court's decision in *Texas* v. *Environmental Protection Agency*, 499 F.2d 289, 321-322 (5th Cir. 1974), called for district court review of regulations, emphasizing the ability of a trial judge to take evidence and to sift facts. In contrast, a recent article by Professors Currie and Goodman advocated that review of "important" regulations be had initially in the courts of appeals, because such regulations ordinarily would have broad and significant scope and because a correct decision was more likely in the courts of appeals by virtue of the collegial decision-making process. (See Currie and Goodman, *Judicial Review Of Federal Administrative Action: Quest for The Optimum Forum*, 75 Colum. L. Rev. 1, 53-54 (1975).)

[81] On June 3, 1976, the House of Representatives passed its version of S. 2710, 94th Cong., 1st Sess. (1975), a Bill which would amend the Act, entitled the "Federal Water Pollution Control Act Amendments of 1976." See 122 Cong. Rec. H5285-5288 (daily ed. June 3, 1976). The House-passed version of this bill would amend the Act to provide that review of guideline regulations issued under Section 304(b) will be had in courts of appeals under the terms of Section 509(b)(1). See *id.* at H5288 (Section 18 of the House-passed Bill).

B. Because Of The Past Uncertainty Over The Applicability Of Section 509(b)(1), This Court Should Construe The Act To Allow Courts Of Appeals To Take Pendent Jurisdiction To Review Guideline Regulations Where The Parties Seek Review Of Concurrently Issued New Source Standards

A number of courts of appeals and district courts have invested a substantial amount of judicial time in deciding actions brought to review EPA effluent regulations for various industrial categories. Similarly, the parties to these many cases have spent considerable time and resources in a good faith effort to obtain the judicial review of EPA's rulemaking actions which the Act promises will be available. The substantive rulings by courts in the review actions constitute a valuable contribution to the development of sound regulations and thus to an improved administration of the Act. These decisions need not be cast aside because of the past uncertainty over the application of the jurisdictional provisions in Section 509(b)(1).

With but two exceptions, courts of appeals have accepted jurisdiction of original proceedings to review guideline regulations in conjunction with review of new source standards promulgated by EPA in the same administrative proceeding and on the same record as the guideline regulations for the same individual category.[82] The instant case presents appropriate circumstances to examine whether the courts of appeals might properly be deemed to have taken pendent jurisdiction over review of the guideline-regulation aspects of the cases. In *Cheng Fan Kwok* v. *Immigration and Naturalization Service*,

[82] The two exceptions are *American Meat Institute* v. *Environmental Protection Agency*, 526 F.2d 442 (7th Cir. 1975), and *Natural Resources Defense Council, Inc.* v. *Environmental Protection Agency*, ___ F.2d ___, 8 E.R.C. 1988 (2d Cir. 1976), where only effluent regulations for existing plants were challenged. The regulations at issue in the *American Meat Institute* case have also been challenged in a district court action where briefing has been had, a hearing has been held, and a decision is pending. *National Independent Meat Packers Ass'n* v. *Environmental Protection Agency*, Civil No. 75-0-369 (D.Neb., hearing held June 4, 1976). The *NRDC* case dealt only with the variance clause in a series of nine separate industrial category regulations. The substantive aspects of the regulations for many of these categories were involved in other cases.

392 U.S. 206, 216 n.16 (1968), this Court expressly noted but declined to decide whether a court of appeals with jurisdiction over one aspect of a deportation order might have "pendent jurisdiction" over a different segment of Immigration Service proceedings applicable to the same alien respecting which jurisdiction would ordinarily rest with a district court.

This Court's decision in *Romero* v. *International Terminal Co.*, 358 U.S. 354, 380-381 (1959), supports the exercise of pendent jurisdiction over a related federal claim. There the Court ruled that a district court has jurisdiction over claims based upon general maritime law pendent to its jurisdiction over claims under the Jones Act. By a parity of reasoning, this is an appropriate case for the exercise by the court of appeals of jurisdiction to review EPA's guideline regulations "pendent" to its jurisdiction to review new source standards promulgated in the same administrative proceeding and on the same record.

A ruling in favor of pendent jurisdiction in these cases would preserve the decision of the court of appeals in *du Pont II* respecting a series of eleven separate product subcategory regulations for the inorganic chemicals industry. It would do so on a basis which would serve the "practical" considerations of policy upon which the court of appeals relied in reaching its erroneous jurisdictional ruling in *du Pont I*. Yet, adoption of a pendent jurisdictional base for the review of guideline regulations would not involve expansion of Section 509(b)(1) beyond its explicit terms, because the review of guideline regulations would be pendent to, not pursuant to, review jurisdiction provided by Section 509(b)(1). As noted previously, an expansive reading of Section 509(b)(1) would carry with it the preclusion and limitation clauses. These clauses would not be invoked by reliance upon a pendent jurisdiction.

A ruling in favor of pendent jurisdiction would maintain the statutory scheme of review of guideline regulations in district courts, unless the parties affirmatively sought to invoke the pendent jurisdiction of a court of appeals. Thus, where an affected party sought to obtain review of guideline regulations only, such review would take place in a district court. See, *e.g.*, *Grain Processing Corp.* v. *Train*, 407 F. Supp. 96 (S.D.

Iowa 1976), *appeal pending* No. 76-1233 (8th Cir.). Moreover, reliance on district court jurisdiction would eliminate the problem created by premature review of the 1983-step regulations. There would be no precise limitation on the time within which the district court review action would have to be brought. Rather, laches would apply. Thus, the reviewing courts would be more comfortable in considering the 1983-step regulations at an appropriate time and not prematurely.

CONCLUSION

In its decisions in *du Pont I* and *du Pont II*, the Fourth Circuit sought to reach a compromise between the commands and prescriptions of the Act and the assertions of EPA. The court of appeals erred in its ruling as to the nature and effect of EPA's effluent regulations for existing plants. The court should have required compliance with the provisions of Sections 304(b), and should not have elided them from the statute in favor of impermissible implications and inferences not supported by the statutory language or by the legislative history of the 1972 Amendments.

Jurisdiction over review actions respecting EPA's guideline regulations ordinarily should be initially in the district courts and not the courts of appeals. In the circumstances of the present cases, however, where the guideline regulations were promulgated concurrently with the new source standards and on the same administrative record, the court of appeals in *du Pont II* properly may be deemed to have had pendent jurisdiction over the guideline review actions.

Based upon such a pendent jurisdiction, the judgment of the court of appeals in *du Pont I* respecting that court's jurisdiction should be remanded for the court of appeals to enter a judgment dismissing the appeal as moot. If pendent jurisdiction is not recognized and accepted by this Court, the decision of the court of appeals in *du Pont I* should be reversed, such that the district court would enter a new judgment upon initial review.

The jurisdiction of the court of appeals in *du Pont II* (before the Court in Nos. 75-1473 and 75-1705) should be upheld based

upon pendent jurisdiction over the petitions for review of guideline regulations. Because the court of appeals wrongly decided the statutory construction issues as to EPA's guideline regulations, the *du Pont II* decision should be reversed in part and remanded for entry of judgment in conformity with this Court's decision. Insofar as review of EPA's new source standards is concerned, the *du Pont II* decision should be affirmed for the reasons stated in the companion brief submitted in Nos. 75-1473 and 75-1705.

Respectfully submitted,

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JULY 16, 1976

In the Supreme Court of the United States

OCTOBER TERM, 1976

No. 75-978

E. I. du Pont de Nemours and Company, et al.,
Petitioners,

v.

Russell E. Train, as Administrator,
Environmental Protection Agency, et al.,
Respondents.

On Writ Of Certiorari To The United States Court Of Appeals For The Fourth Circuit

APPENDICES TO PETITIONERS' BRIEF

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APPENDICES TO PETITIONERS' BRIEF

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APPENDIX A

The pertinent provisions of the Federal Water Pollution Control Act, as amended, 33 U.S.C. §§ 1251 *et seq.*, are as follows:

§ 1251 [101*]. Congressional declaration of goals and policy

(a) The objective of this chapter is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. In order to achieve this objective it is hereby declared that, consistent with the provisions of this chapter—

(1) it is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985;

(2) it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983;

(3) it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited;

(4) it is the national policy that Federal financial assistance be provided to construct publicly owned waste treatment works;

(5) it is the national policy that areawide waste treatment management planning processes be developed and implemented to assure adequate control of sources of pollutants in each State; and

(6) it is the national policy that a major research and demonstration effort be made to develop technology necessary to eliminate the discharge of pollutants into the navigable waters, waters of the contiguous zone, and the oceans.

(b) It is the policy of the Congress to recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution, to plan the development and use (including restoration, preservation, and enhancement) of land and water re-

* Section numbers from the Act itself are bracketed alongside section numbers from 33 U.S.C.

sources, and to consult with the Administrator in the exercise of his authority under this chapter. It is further the policy of the Congress to support and aid research relating to the prevention, reduction, and elimination of pollution, and to provide Federal technical services and financial aid to State and interstate agencies and municipalities in connection with the prevention, reduction, and elimination of pollution.

(c) It is further the policy of Congress that the President, acting through the Secretary of State and such national and international organizations as he determines appropriate, shall take such action as may be necessary to insure that to the fullest extent possible all foreign countries shall take meaningful action for the prevention, reduction, and elimination of pollution in their waters and in international waters and for the achievement of goals regarding the elimination of discharge of pollutants and the improvement of water quality to at least the same extent as the United States does under its laws.

(d) Except as otherwise expressly provided in this chapter, the Administrator of the Environmental Protection Agency (hereinafter in this chapter called "Administrator") shall administer this chapter.

(e) Public participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan, or program established by the Administrator or any State under this chapter shall be provided for, encouraged, and assisted by the Administrator and the States. The Administrator, in cooperation with the States, shall develop and publish regulations specifying minimum guidelines for public participation in such processes.

(f) It is the national policy that to the maximum extent possible the procedures utilized for implementing this chapter shall encourage the drastic minimization of paperwork and interagency decision procedures, and the best use of available manpower and funds, so as to prevent needless

duplication and unnecessary delays at all levels of government.

§ 1311 [301]. Effluent limitations—Illegality of pollutant discharges except in compliance with law

(a) Except as in compliance with this section and sections 1312, 1316, 1317, 1328, 1342, and 1344 of this title, the discharge of any pollutant by any person shall be unlawful.

Timetable for achievement of objectives

(b) In order to carry out the objective of this chapter there shall be achieved—

(1) (A) not later than July 1, 1977, effluent limitations for point sources, other than publicly owned treatment works, (i) which shall require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 1314(b) of this title, or (ii) in the case of a discharge into a publicly owned treatment works which meets the requirements of subparagraph (B) of this paragraph, which shall require compliance with any applicable pretreatment requirements and any requirements under section 1317 of this title; and

(B) for publicly owned treatment works in existence on July 1, 1977, or approved pursuant to section 1283 of this title prior to June 30, 1974 (for which construction must be completed within four years of approval), effluent limitations based upon secondary treatment as defined by the Administrator pursuant to section 1314(d) (1) of this title; or,

(C) not later than July 1, 1977, any more stringent limitation, including those necessary to meet water quality standards, treatment standards, or schedules of compliance, established pursuant to any State law or regulations (under authority preserved by section 1370 of this title) or any other Federal law or regulation, or required to implement any applicable water quality standard established pursuant to this chapter.

(2) (A) not later than July 1, 1983, effluent limitations for categories and classes of point sources, other than publicly owned treatment works, which (i) shall require application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Administrator pursuant to section 1314(b) (2) of this title, which such effluent limitations shall require the elimination of discharges of all pollutants if the Administrator finds, on the basis of information available to him (including information developed pursuant to section 1325 of this title), that such elimination is technologically and economically achievable for a category or class of point sources as determined in accordance with regulations issued by the Administrator pursuant to section 1314(b) (2) of this title, or (ii) in the case of the introduction of a pollutant into a publicly owned treatment works which meets the requirements of subparagraph (B) of this paragraph, shall require compliance with any applicable pretreatment requirements and any other requirement under section 1317 of this title; and

(B) not later than July 1, 1983, compliance by all publicly owned treatment works with the requirements set forth in section 1281(g) (2) (A) of this title.

Modification of timetable

(c) The Administrator may modify the requirements of subsection (b)(2)(A) of this section with respect to any point source for which a permit application is filed after July 1, 1977, upon a showing by the owner or operator of such point source satisfactory to the Administrator that such modified requirements (1) will represent the maximum use of technology within the economic capability of the owner or operator; and (2) will result in reasonable further progress toward the elimination of the discharge of pollutants.

Review and revision of effluent limitations

(d) Any effluent limitation required by paragraph (2) of subsection (b) of this section shall be reviewed at least every five years and, if appropriate, revised pursuant to the procedure established under such paragraph.

All point discharge source application of effluent limitations

(e) Effluent limitations established pursuant to this section or section 1312 of this title shall be applied to all point sources of discharge of pollutants in accordance with the provisions of this chapter.

Illegality of discharge of radiological, chemical, or biological warfare agents or high-level radioactive waste

(f) Notwithstanding any other provisions of this chapter it shall be unlawful to discharge any radiological, chemical, or biological warfare agent or high-level radioactive waste into the navigable waters.

§ 1312 [302]. Water quality related effluent limitations

(a) Whenever, in the judgment of the Administrator, discharges of pollutants from a point source or group of point sources, with the application of effluent limitations required under section 1311(b) (2) of this title, would interfere with the attainment or maintenance of that water quality in a specific portion of the navigable waters which shall assure protection of public water supplies, agricultural and industrial uses, and the protection and propagation of a balanced population of shellfish, fish and wildlife, and allow recreational activities in and on the water, effluent limitations (including alternative effluent control strategies) for such point source or sources shall be established which can reasonably be expected to contribute to the attainment or maintenance of such water quality.

(b) (1) Prior to establishment of any effluent limitation pursuant to subsection (a) of this section, the Administrator shall issue notice of intent to establish such limitation and within ninety days of such notice hold a public hearing to determine the relationship of the economic and social

costs of achieving any such limitation or limitations, including any economic or social dislocation in the affected community or communities, to the social and economic benefits to be obtained (including the attainment of the objective of this chapter) and to determine whether or not such effluent limitations can be implemented with available technology or other alternative control strategies.

(2) If a person affected by such limitation demonstrates at such hearing that (whether or not such technology or other alternative control strategies are available) there is no reasonable relationship between the economic and social costs and the benefits to be obtained (including attainment of the objective of this chapter), such limitation shall not become effective and the Administrator shall adjust such limitation as it applies to such person.

(c) The establishment of effluent limitations under this section shall not operate to delay the application of any effluent limitation established under section 1311 of this title.

§ 1314 [304]. Information and guidelines—Criteria development and publication

(a) (1) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall develop and publish, within one year after October 18, 1972 (and from time to time thereafter revise) criteria for water quality accurately reflecting the latest scientific knowledge (A) on the kind and extent of all identifiable effects on health and welfare including, but not limited to, plankton, fish, shellfish, wildlife, plant life, shorelines, beaches, esthetics, and recreation which may be expected from the presence of pollutants in any body of water, including ground water; (B) on the concentration and dispersal of pollutants, or their byproducts, through biological, physical, and chemical processes; and (C) on the effects of pollutants on biological community diversity, productivity, and stability, including information on the

factors affecting rates of eutrophication and rates of organic and inorganic sedimentation for varying types of receiving waters.

(2) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall develop and publish, within one year after October 18, 1972 (and from time to time thereafter revise) information (A) on the factors necessary to restore and maintain the chemical, physical, and biological integrity of all navigable waters, ground waters, waters of the contiguous zone, and the oceans; (B) on the factors necessary for the protection and propagation of shellfish, fish, and wildlife for classes and categories of receiving waters and to allow recreational activities in and on the water; and (C) on the measurement and classification of water quality; and (D) for the purpose of section 1313 of this title, on and the identification of pollutants suitable for maximum daily load measurement correlated with the achievement of water quality objectives.

(3) Such criteria and information and revisions thereof shall be issued to the States and shall be published in the Federal Register and otherwise made available to the public.

Effluent limitation guidelines

(b) For the purpose of adopting or revising effluent limitations under this chapter the Administrator shall, after consultation with appropriate Federal and State agencies and other interested persons, publish within one year of October 18, 1972, regulations, providing guidelines for effluent limitations and, at least annually thereafter, revise, if appropriate, such regulations. Such regulations shall—

(1) (A) identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of the best prac-

ticable control technology currently available for classes and categories of point sources (other than publicly owned treatment works); and

(B) specify factors to be taken into account in determining the control measures and practices to be applicable to point sources (other than publicly owned treatment works) within such categories or classes. Factors relating to the assessment of best practicable control technology currently available to comply with subsection (b) (1) of section 1311 of this title shall include consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application, and shall also take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate;

(2) (A) identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of the best control measures and practices achievable including treatment techniques, process and procedure innovations, operating methods, and other alternatives for classes and categories of point sources (other than publicly owned treatment works); and

(B) specify factors to be taken into account in determining the best measures and practices available to comply with subsection (b) (2) of section 1311 of this title to be applicable to any point source (other than publicly owned treatment works) within such categories or classes. Factors relating to the assessment of best available technology shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate; and

(3) Identify control measures and practices available to eliminate the discharge of pollutants from categories and classes of point sources, taking into account the cost of achieving such elimination of the discharge of pollutants.

Pollution discharge elimination procedures

(c) The Administrator, after consultation, with appropriate Federal and State agencies and other interested persons, shall issue to the States and appropriate water pollution control agencies within 270 days after October 18, 1972 (and from time to time thereafter) information on the processes, procedures, or operating methods which result in the elimination or reduction of the discharge of pollutants to implement standards of performance under section 1316 of this title. Such information shall include technical and other data, including costs, as are available on alternative methods of elimination or reduction of the discharge of pollutants. Such information, and revisions thereof, shall be published in the Federal Register and otherwise shall be made available to the public.

Secondary treatment information; alternative waste treatment management techniques and systems

(d) (1) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall publish within sixty days after October 18, 1972 (and from time to time thereafter) information, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, on the degree of effluent reduction attainable through the application of secondary treatment.

(2) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall publish within nine months after October 18, 1972 (and from time to time thereafter) information on alternative waste treatment management techniques and systems available to implement section 1281 of this title.

Identification and evaluation of nonpoint sources of pollution; processes, procedures, and methods to control pollution

(e) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall issue to appropriate Federal agencies, the States, water pollution control agencies, and agencies designated under section 1288 of this title, within one year after October 18, 1972 (and from time to time thereafter) information including (1) guidelines for identifying and evaluating the nature and extent of nonpoint sources of pollutants, and (2) processes, procedures, and methods to control pollution resulting from—

(A) agricultural and silvicultural activities, including runoff from fields and crop and forest lands;

(B) mining activities, including runoff and siltation from new, currently operating, and abandoned surface and underground mines;

(C) all construction activity, including runoff from the facilities resulting from such construction;

(D) the disposal of pollutants in wells or in subsurface excavations;

(E) salt water intrusion resulting from reductions of fresh water flow from any cause including extraction of ground water, irrigation, obstruction, and diversion; and

(F) changes in the movement, flow, or circulation of any navigable waters or ground waters, including changes caused by the construction of dams, levees, channels, causeways, or flow diversion facilities.

Such information and revisions thereof shall be published in the Federal Register and otherwise made available to the public.

Guidelines for pretreatment of pollutants

(f) (1) For the purpose of assisting States in carrying out programs under section 1342 of this title, the Administrator shall publish, within one hundred and twenty days after October 18, 1972, and review at least annually thereafter and, if appropriate, revise guidelines for pretreatment of pollutants which he determines are not susceptible to treatment by publicly owned treatment works. Guidelines under this subsection shall be established to control and prevent the discharge into the navigable waters, the contiguous zone, or the ocean (either directly or through publicly owned treatment works) of any pollutant which interferes with, passes through, or otherwise is incompatible with such works.

(2) When publishing guidelines under this subsection, the Administrator shall designate the category or categories of treatment works to which the guidelines shall apply.

Test procedure guidelines

(g) The Administrator shall, within one hundred and eighty days from October 18, 1972, promulgate guidelines establishing test procedures for the analysis of pollutants that shall include the factors which must be provided in any certification pursuant to section 1341 of this title or permit application pursuant to section 1342 of this title.

Guidelines for monitoring, reporting, enforcement, funding, personnel, and manpower

(h) The Administrator shall (1) within sixty days after October 18, 1972, promulgate guidelines for the purpose of establishing uniform application forms and other minimum requirements for the acquisition of information from owners and operators of point-sources of discharge subject to any State program under section 1342 of this title, and (2) within sixty days from October 18, 1972, promulgate guidelines establishing the minimum procedural and other elements of any State program under section 1342 of this title which shall include:

(A) monitoring requirements;

(B) reporting requirements (including procedures to make information available to the public);

(C) enforcement provisions; and

(D) funding, personnel qualifications, and manpower requirements (including a requirement that no board or body which approves permit applications or portions thereof shall include, as a member, any person who receives, or has during the previous two years received, a significant portion of his income directly or indirectly from permit holders or applicants for a permit.)

Restoration and enhancement of publicly owned fresh water lakes

(i) The Administrator shall, within 270 days after October 18, 1972 (and from time to time thereafter), issue such information on methods, procedures, and processes as may be appropriate to restore and enhance the quality of the Nation's publicly owned fresh water lakes.

Agreements with Secretaries of Agriculture, Army, and Interior to provide maximum utilization of programs to achieve and maintain water quality; transfer of funds; authorization of appropriations

(j) (1) The Administrator shall, within six months from October 18, 1972, enter into agreements with the Secretary of Agriculture, the Secretary of the Army, and the Secretary of the Interior to provide for the maximum utilization of the appropriate programs authorized under other Federal law to be carried out by such Secretaries for the purpose of achieving and maintaining water quality through appropriate implementation of plans approved under section 1288 of this title.

(2) The Administrator, pursuant to any agreement under paragraph (1) of this subsection is authorized to transfer to the Secretary of Agriculture, the Secretary of the Army, or the Secretary of the Interior any funds appropriated under paragraph (3) of this subsection to supplement any funds otherwise appropriated to carry out

appropriate programs authorized to be carried out by such Secretaries.

(3) There is authorized to be appropriated to carry out the provisions of this subsection, $100,000,000 per fiscal year for the fiscal year ending June 30, 1973, and the fiscal year ending June 30, 1974.

§ 1316 [306]. National standards of performance—Definitions

(a) For purposes of this section:

(1) The term "standard of performance" means a standard for the control of the discharge of pollutants which reflects the greatest degree of effluent reduction which the Administrator determines to be achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants.

(2) The term "new source" means any source, the construction of which is commenced after the publication of proposed regulations prescribing a standard of performance under this section which will be applicable to such source, if such standard is thereafter promulgated in accordance with this section.

(3) The term "source" means any building, structure, facility, or installation from which there is or may be the discharge of pollutants.

(4) The term "owner or operator" means any person who owns, leases, operates, controls, or supervises a source.

(5) The term "construction" means any placement, assembly, or installation of facilities or equipment (including contractual obligations to purchase such facilities or equipment) at the premises where such equipment will be used, including preparation work at such premises.

Categories of sources; Federal standards of performance for new sources

(b) (1) (A) The Administrator shall, within ninety days after October 18, 1972, publish (and from time to time thereafter shall revise) a list of categories of sources, which shall, at the minimum, include:

pulp and paper mills;
paperboard, builders paper and board mills;
meat product and rendering processing;
dairy product processing;
grain mills;
canned and preserved fruits and vegetables processing;
canned and preserved seafood processing;
sugar processing;
textile mills;
cement manufacturing;
feedlots;
electroplating;
organic chemicals manufacturing;
inorganic chemicals manufacturing;
plastic and synthetic materials manufacturing;
soap and detergent manufacturing;
fertilizer manufacturing;
petroleum refining;
iron and steel manufacturing;
nonferrous metals manufacturing;
phosphate manufacturing;
steam electric powerplants;
feroalloy manufacturing;
leather tanning and finishing;
glass and asbestos manufacturing;
rubber processing; and
timber products processing.

(B) As soon as practicable, but in no case more than one year, after a category of sources is included in a list under subparagraph (A) of this paragraph, the Administrator shall propose and publish regulations establishing Federal standards of performance for new sources within such category. The Administrator shall afford interested persons an opportunity for written comment on such proposed regulations. After considering such comments, he shall promulgate, within one hundred and twenty days

after publication of such proposed regulations, such standards with such adjustments as he deems appropriate. The Administrator shall, from time to time, as technology and alternatives change, revise such standards following the procedure required by this subsection for promulgation of such standards. Standards of performance, or revisions thereof, shall become effective upon promulgation. In establishing or revising Federal standards of performance for new sources under this section, the Administrator shall take into consideration the cost of achieving such effluent reduction, and any non-water quality environmental impact and energy requirements.

(2) The Administrator may distinguish among classes, types, and sizes within categories of new sources for the purpose of establishing such standards and shall consider the type of process employed (including whether batch or continuous).

(3) The provisions of this section shall apply to any new source owned or operated by the United States.

State enforcement of standards of performance

(c) Each State may develop and submit to the Administrator a procedure under State law for applying and enforcing standards of performance for new sources located in such State. If the Administrator finds that the procedure and the law of any State require the application and enforcement of standards of performance to at least the same extent as required by this section, such State is authorized to apply and enforce such standards of performance (except with respect to new sources owned or operated by the United States).

Protection from more stringent standards

(d) Notwithstanding any other provision of this chapter, any point source the construction of which is commenced after October 18, 1972, and which is so constructed

as to meet all applicable standards of performance shall not be subject to any more stringent standard of performance during a ten-year period beginning on the date of completion of such construction or during the period of depreciation or amortization of such facility for the purposes of section 167 or 169 (or both) of Title 26, whichever period ends first.

Illegality of operation of new sources in violation of applicable standards of performance

(e) After the effective date of standards of performance promulgated under this section, it shall be unlawful for any owner or operator of any new source to operate such source in violation of any standard of performance applicable to such source.

§ 1317 [307]. Toxic and pretreatment effluent standards; establishment; revision; illegality of source operation in violation of standards

(a) (1) The Administrator shall, within ninety days after October 18, 1972, publish (and from time to time thereafter revise) a list which includes any toxic pollutant or combination of such pollutants for which an effluent standard (which may include a prohibition of the discharge of such pollutants or combination of such pollutants) will be established under this section. The Administrator in publishing such list shall take into account the toxicity of the pollutant, its persistence, degradability, the usual or potential presence of the affected organisms in any waters, the importance of the affected organisms and the nature and extent of the effect of the toxic pollutant on such organisms.

(2) Within one hundred and eighty days after the date of publication of any list, or revision thereof, containing toxic pollutants or combination of pollutants under paragraph (1) of this subsection, the Administrator, in accordance with section 553 of Title 5, shall publish a proposed

effluent standard (or a prohibition) for such pollutant or combination of pollutants which shall take into account the toxicity of the pollutant, its persistence, degradability, the usual or potential presence of the affected organisms in any waters, the importance of the affected organisms and the nature and extent of the effect of the toxic pollutant on such organisms, and he shall publish a notice for a public hearing on such proposed standard to be held within thirty days. As soon as possible after such hearing, but not later than six months after publication of the proposed effluent standard (or prohibition), unless the Administrator finds, on the record, that a modification of such proposed standard (or prohibition) is justified based upon a preponderance of evidence adduced at such hearings, such standard (or prohibition) shall be promulgated.

(3) If after a public hearing the Administrator finds that a modification of such proposed standard (or prohibition) is justified, a revised effluent standard (or prohibition) for such pollutant or combination of pollutants shall be promulgated immediately. Such standard (or prohibition) shall be reviewed and, if appropriate, revised at least every three years.

(4) Any effluent standard promulgated under this section shall be at that level which the Administrator determines provides an ample margin of safety.

(5) When proposing or promulgating any effluent standard (or prohibition) under this section, the Administrator shall designate the category or categories of sources to which the effluent standard (or prohibition) shall apply. Any disposal of dredged material may be included in such a category of sources after consultation with the Secretary of the Army.

(6) Any effluent standard (or prohibition) established pursuant to this section shall take effect on such date or dates as specified in the order promulgating such standard, but in no case more than one year from the date of such promulgation.

(7) Prior to publishing any regulations pursuant to this section the Administrator shall, to the maximum extent practicable within the time provided, consult with appropriate advisory committees, States, independent experts, and Federal departments and agencies.

(b) (1) The Administrator shall, within one hundred and eighty days after October 18, 1972, and from time to time thereafter, publish proposed regulations establishing pretreatment standards for introduction of pollutants into treatment works (as defined in section 1292 of this title) which are publicly owned for those pollutants which are determined not to be susceptible to treatment by such treatment works or which would interfere with the operation of such treatment works. Not later than ninety days after such publication, and after opportunity for public hearing, the Administrator shall promulgate such pretreatment standards. Pretreatment standards under this subsection shall specify a time for compliance not to exceed three years from the date of promulgation and shall be established to prevent the discharge of any pollutant through treatment works (as defined in section 1292 of this title) which are publicly owned, which pollutant interferes with, passes through, or otherwise is incompatible with such works.

(2) The Administrator shall, from time to time, as control technology, processes, operating methods, or other alternatives change, revise such standards following the procedure established by this subsection for promulgation of such standards.

(3) When proposing or promulgating any pretreatment standard under this section, the Administrator shall designate the category or categories of sources to which such standard shall apply.

(4) Nothing in this subsection shall affect any pretreatment requirement established by any State or local law not in conflict with any pretreatment standard established under this subsection.

(c) In order to insure that any source introducing pollutants into a publicly owned treatment works, which source would be a new source subject to section 1316 of this title if it were to discharge pollutants, will not cause a violation of the effluent limitations established for any such treatment works, the Administrator shall promulgate pretreatment standards for the category of such sources simultaneously with the promulgation of standards of performance under section 1316 of this title for the equivalent category of new sources. Such pretreatment standards shall prevent the discharge of any pollutant into such treatment works, which pollutant may interfere with, pass through, or otherwise be incompatible with such works.

(d) After the effective date of any effluent standard or prohibition or pretreatment standard promulgated under this section, it shall be unlawful for any owner or operator of any source to operate any source in violation of any such effluent standard or prohibition or pretreatment standard.

§ 1319 [309]. Enforcement—State enforcement; compliance orders

(a) (1) Whenever, on the basis of any information available to him, the Administrator finds that any person is in violation of any condition or limitation which implements section 1311, 1312, 1316, 1317, or 1318 of this title in a permit issued by a State under an approved permit program under section 1342 of this title, he shall proceed under his authority in paragraph (3) of this subsection or he shall notify the person in alleged violation and such State of such finding. If beyond the thirtieth day after the Administrator's notification the State has not commenced appropriate enforcement action, the Administrator shall issue an order requiring such person to comply with such condition or limitation or shall bring a civil action in accordance with subsection (b) of this section.

(2) Whenever, on the basis of information available to him, the Administrator finds that violations of permit con-

ditions or limitations as set forth in paragraph (1) of this subsection are so widespread that such violations appear to result from a failure of the State to enforce such permit conditions or limitations effectively, he shall so notify the State. If the Administrator finds such failure extends beyond the thirtieth day after such notice, he shall give public notice of such finding. During the period beginning with such public notice and ending when such State satisfies the Administrator that it will enforce such conditions and limitations (hereafter referred to in this section as the period of "federally assumed enforcement"), the Administrator shall enforce any permit condition or limitation with respect to any person—

(A) by issuing an order to comply with such condition or limitation, or

(B) by bringing a civil action under subsection (b) of this section.

(3) Whenever on the basis of any information available to him the Administrator finds that any person is in violation of section 1311, 1312, 1316, 1317, or 1318 of this title, or is in violation of any permit condition or limitation implementing any of such sections in a permit issued under section 1342 of this title by him or by a State, he shall issue an order requiring such person to comply with such section or requirement, or he shall bring a civil action in accordance with subsection (b) of this section.

(4) A copy of any order issued under this subsection shall be sent immediately by the Administrator to the State in which the violation occurs and other affected States. Any order issued under this subsection shall be by personal service and shall state with reasonable specificity the nature of the violation, specify a time for compliance, not to exceed thirty days, which the Administrator determines is reasonable, taking into account the seriousness of the violation and any good faith efforts to comply with applicable requirements. In any case in which an order under this subsection (or notice to a violator under paragraph (1) of this subsection) is issued to a corporation, a copy of such order (or notice) shall be served on any appropriate corporate officers. An order issued under this subsection relating to a violation of section 1318 of this title shall not take effect until the person to whom it is issued has had an opportunity to confer with the Administrator concerning the alleged violation.

Civil actions

(b) The Administrator is authorized to commence a civil action for appropriate relief, including a permanent or temporary injunction, for any violation for which he is authorized to issue a compliance order under subsection (a) of this section. Any action under this subsection may be brought in the district court of the United States for the district in which the defendant is located or resides or is doing business, and such court shall have jurisdiction to restrain such violation and to require compliance. Notice of the commencement of such action shall be given immediately to the appropriate State.

Criminal penalties

(c) (1) Any person who willfully or negligently violates section 1311, 1312, 1316, 1317, or 1318 of this title, or any permit condition or limitation implementing any of such sections in a permit issued under section 1342 of this title by the Administrator or by a State, shall be punished by a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or by both. If the conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $50,000 per day of violation, or by imprisonment for not more than two years, or by both.

(2) Any person who knowingly makes any false statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under this chapter, or who falsifies, tam-

pers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this chapter, shall upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than six months, or by both.

(3) For the purposes of this subsection, the term "person" shall mean, in addition to the definition contained in section 1362(5) of this title, any responsible corporate officer.

Civil penalties

(d) Any person who violates section 1311, 1312, 1316, 1317, or 1318 of this title, or any permit condition or limitation implementing any of such sections in a permit issued under section 1342 of this title by the Administrator, or by a State, and any person who violates any order issued by the Administrator under subsection (a) of this section, shall be subject to a civil penalty not to exceed $10,000 per day of such violation.

State liability for judgments and expenses

(e) Whenever a municipality is a party to a civil action brought by the United States under this section, the State in which such municipality is located shall be joined as a party. Such State shall be liable for payment of any judgment, or any expenses incurred as a result of complying with any judgment, entered against the municipality in such action to the extent that the laws of that State prevent the municipality from raising revenues needed to comply with such judgment.

§ 1341 [401]. Certification—Compliance with applicable requirements; application; procedures; license suspension

(a) (1) Any applicant for a Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates or will originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over the navigable waters at the point where the discharge originates or will originate, that any such discharge will comply with the applicable provisions of sections 1311, 1312, 1316, and 1317 of this title. In the case of any such activity for which there is not an applicable effluent limitation or other limitation under sections 1311(b) and 1312 of this title, and there is not an applicable standard under sections 1316 and 1317 of this title, the State shall so certify, except that any such certification shall not be deemed to satisfy section 1371(c) of this title. Such State or interstate agency shall establish procedures for public notice in the case of all applications for certification by it and, to the extent it deems appropriate, procedures for public hearings in connection with specific applications. In any case where a State or interstate agency has no authority to give such a certification, such certification shall be from the Administrator. If the State, interstate agency, or Administrator, as the case may be, fails or refuses to act on a request for certification, within a reasonable period of time (which shall not exceed one year) after receipt of such request, the certification requirements of this subsection shall be waived with respect to such Federal application. No license or permit shall be granted until the certification required by this section has been obtained or has been waived as provided in the preceding sentence. No license or permit shall be granted if certification has been denied by the State, interstate agency, or the Administrator, as the case may be.

(2) Upon receipt of such application and certification the licensing or permitting agency shall immediately notify the Administrator of such application and certification. Whenever such a discharge may affect, as determined by the Administrator, the quality of the waters of any other

State, the Administrator within thirty days of the date of notice of application for such Federal license or permit shall so notify such other State, the licensing or permitting agency, and the applicant. If, within sixty days after receipt of such notification, such other State determines that such discharge will affect the quality of its waters so as to violate any water quality requirement in such State, and within such sixty-day period notifies the Administrator and the licensing or permitting agency in writing of its objection to the issuance of such license or permit and requests a public hearing on such objection, the licensing or permitting agency shall hold such a hearing. The Administrator shall at such hearing submit his evaluation and recommendations with respect to any such objection to the licensing or permitting agency. Such agency, based upon the recommendations of such State, the Administrator, and upon any additional evidence, if any, presented to the agency at the hearing, shall condition such license or permit in such manner as may be necessary to insure compliance with applicable water quality requirements. If the imposition of conditions cannot insure such compliance such agency shall not issue such license or permit.

(3) The certification obtained pursuant to paragraph (1) of this subsection with respect to the construction of any facility shall fulfill the requirements of this subsection with respect to certification in connection with any other Federal license or permit required for the operation of such facility unless, after notice to the certifying State, agency, or Administrator, as the case may be, which shall be given by the Federal agency to whom application is made for such operating license or permit, the State, or if appropriate, the interstate agency or the Administrator, notifies such agency within sixty days after receipt of such notice that there is no longer reasonable assurance that there will be compliance with the applicable provisions of sections 1311, 1312, 1316, and 1317 of this title because of changes since the construction license or permit certification was issued in (A) the construction or operation of the facility,

(B) the characteristics of the waters into which such discharge is made, (C) the water quality criteria applicable to such waters or (D) applicable effluent limitations or other requirements. This paragraph shall be inapplicable in any case where the applicant for such operating license or permit has failed to provide the certifying State, or if appropriate, the interstate agency or the Administrator, with notice of any proposed changes in the construction or operation of the facility with respect to which a construction license or permit has been granted, which changes may result in violation of section 1311, 1312, 1316, or 1317 of this title.

(4) Prior to the initial operation of any federally licensed or permitted facility or activity which may result in any discharge into the navigable waters and with respect to which a certification has been obtained pursuant to paragraph (1) of this subsection, which facility or activity is not subject to a Federal operating license or permit, the licensee or permittee shall provide an opportunity for such certifying State, or, if appropriate, the interstate agency or the Administrator to review the manner in which the facility or activity shall be operated or conducted for the purposes of assuring that applicable effluent limitations or other limitations or other applicable water quality requirements will not be violated. Upon notification by the certifying State, or if appropriate, the interstate agency or the Administrator that the operation of any such federally licensed or permitted facility or activity will violate applicable effluent limitations or other limitations or other water quality requirements such Federal agency may, after public hearing, suspend such license or permit. If such license or permit is suspended, it shall remain suspended until notification is received from the certifying State, agency, or Administrator, as the case may be, that there is reasonable assurance that such facility or activity will not violate the applicable provisions of section 1311, 1312, 1316, or 1317 of this title.

(5) Any Federal license or permit with respect to which a certification has been obtained under paragraph (1) of this subsection may be suspended or revoked by the Federal agency issuing such license or permit upon the entering of a judgment under this chapter that such facility or activity has been operated in violation of the applicable provisions of section 1311, 1312, 1316, or 1317 of this title.

(6) No Federal agency shall be deemed to be an applicant for the purposes of this subsection.

(7) Except with respect to a permit issued under section 1342 of this title, in any case where actual construction of a facility has been lawfully commenced prior to April 3, 1970, no certification shall be required under this subsection for a license or permit issued after April 3, 1970, to operate such facility, except that any such license or permit issued without certification shall terminate April 3, 1973, unless prior to such termination date the person having such license or permit submits to the Federal agency which issued such license or permit a certification and otherwise meets the requirements of this section.

Compliance with other provisions of law setting applicable water quality requirements

(b) Nothing in this section shall be construed to limit the authority of any department or agency pursuant to any other provision of law to require compliance with any applicable water quality requirements. The Administrator shall, upon the request of any Federal department or agency, or State or interstate agency, or applicant, provide, for the purpose of this section, any relevant information on applicable effluent limitations, or other limitations, standards, regulations, or requirements, or water quality criteria, and shall, when requested by any such department or agency or State or interstate agency, or applicant, comment on any methods to comply with such limitations, standards, regulations, requirements, or criteria.

Authority of Secretary of the Army to permit use of spoil disposal areas by Federal licensees or permittees

(c) In order to implement the provisions of this section, the Secretary of the Army, acting through the Chief of Engineers, is authorized, if he deems it to be in the public interest, to permit the use of spoil disposal areas under his jurisdiction by Federal licensees or permittees, and to make an appropriate charge for such use. Moneys received from such licensees or permittees shall be deposited in the Treasury as miscellaneous receipts.

Limitations and monitoring requirements of certification

(d) Any certification provided under this section shall set forth any effluent limitations and other limitations, and monitoring requirements necessary to assure that any applicant for a Federal license or permit will comply with any applicable effluent limitations and other limitations, under section 1311 or 1312 of this title, standard of performance under section 1316 of this title, or prohibition, effluent standard, or pretreatment standard under section 1317 of this title, and with any other appropriate requirement of State law set forth in such certification, and shall become a condition on any Federal license or permit subject to the provisions of this section.

§ 1342 [402]. National pollutant discharge elimination system—Permits for discharge of pollutants

(a) (1) Except as provided in sections 1328 and 1344 of this title, the Administrator may, after opportunity for public hearing, issue a permit for the discharge of any pollutant, or combination of pollutants, notwithstanding section 1311(a) of this title, upon condition that such discharge will meet either all applicable requirements under sections 1311, 1312, 1316, 1317, 1318, and 1343 of this title, or prior to the taking of necessary implementing actions relating to all such requirements, such conditions as

the Administrator determines are necessary to carry out the provisions of this chapter.

(2) The Administrator shall prescribe conditions for such permits to assure compliance with the requirements of paragraph (1) of this subsection, including conditions on data and information collection, reporting, and such other requirements as he deems appropriate.

(3) The permit program of the Administrator under paragraph (1) of this subsection, and permits issued thereunder, shall be subject to the same terms, conditions, and requirements as apply to a State permit program and permits issued thereunder under subsection (b) of this section.

(4) All permits for discharges into the navigable waters issued pursuant to section 407 of this title, shall be deemed to be permits issued under this title, and permits issued under this title shall be deemed to be permits issued under section 407 of this title, and shall continue in force and effect for their term unless revoked, modified, or suspended in accordance with the provisions of this chapter.

(5) No permit for a discharge into the navigable waters shall be issued under section 407 of this title after October 18, 1972. Each application for a permit under section 407 of this title, pending on October 18, 1972, shall be deemed to be an application for a permit under this section. The Administrator shall authorize a State, which he determines has the capability of administering a permit program which will carry out the objective of this chapter, to issue permits for discharges into the navigable waters within the jurisdiction of such State. The Administrator may exercise the authority granted him by the preceding sentence only during the period which begins on October 18, 1972, and ends either on the ninetieth day after the date of the first promulgation of guidelines required by section 1314(h) (2) of this title, or the date of approval by the Administrator of a permit program for such State under subsection (b) of this section, whichever date first occurs, and no such authorization to a State shall extend

beyond the last day of such period. Each such permit shall be subject to such conditions as the Administrator determines are necessary to carry out the provisions of this chapter. No such permit shall issue if the Administrator objects to such issuance.

State permit programs

(b) At any time after the promulgation of the guidelines required by subsection (h) (2) of section 1314 of this title, the Governor of each State desiring to administer its own permit program for discharges into navigable waters within its jurisdiction may submit to the Administrator a full and complete description of the program it proposes to establish and administer under State law or under an interstate compact. In addition, such State shall submit a statement from the attorney general (or the attorney for those State water pollution control agencies which have independent legal counsel), or from the chief legal officer in the case of an interstate agency, that the laws of such State, or the interstate compact, as the case may be, provide adequate authority to carry out the described program. The Administrator shall approve each such submitted program unless he determines that adequate authority does not exist:

(1) To issue permits which—

(A) apply, and insure compliance with, any applicable requirements of sections 1311, 1312, 1316, 1317, and 1343 of this title;

(B) are for fixed terms not exceeding five years; and

(C) can be terminated or modified for cause including, but not limited to, the following:

(i) violation of any condition of the permit;

(ii) obtaining a permit of misrepresentation, or failure to disclose fully all relevant facts;

(iii) change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;

(D) control the disposal of pollutants into wells;

(2) (A) To issue permits which apply, and insure compliance with, all applicable requirements of section 1318 of this title, or

(B) To inspect, monitor, enter, and require reports to at least the same extent as required in section 1318 of this title;

(3) To insure that the public, and any other State the waters of which may be affected, receive notice of each application for a permit and to provide an opportunity for public hearing before a ruling on each such application;

(4) To insure that the Administrator receives notice of each application (including a copy thereof) for a permit;

(5) To insure that any State (other than the permitting State), whose waters may be affected by the issuance of a permit may submit written recommendations to the permitting State (and the Administrator) with respect to any permit application and, if any part of such written recommendations are not accepted by the permitting State, that the permitting State will notify such affected State (and the Administrator) in writing of its failure to so accept such recommendations together with its reasons for so doing;

(6) To insure that no permit will be issued if, in the judgment of the Secretary of the Army acting through the Chief of Engineers, after consultation with the Secretary of the department in which the Coast Guard is operating, anchorage and navigation of any of the navigable waters would be substantially impaired thereby;

(7) To abate violations of the permit or the permit program, including civil and criminal penalties and other ways and means of enforcement;

(8) To insure that any permit for a discharge from a publicly owned treatment works includes conditions to require adequate notice to the permitting agency of (A) new introductions into such works of pollutants from any source which would be a new source as defined in section 1316 of this title if such source were discharging pollutants, (B) new introductions of pollutants into such works from a source which would be subject to section 1311 of this title if it were discharging such pollutants, or (C) a substantial change in volume or character of pollutants being introduced into such works by a source introducing pollutants into such works at the time of issuance of the permit. Such notice shall include information on the quality and quantity of effluent to be introduced into such treatment works and any anticipated impact of such change in the quantity or quality of effluent to be discharged from such publicly owned treatment works; and

(9) To insure that any industrial user of any publicly owned treatment works will comply with sections 1284(b), 1317, and 1318 of this title.

Suspension of federal program upon submission of State program; withdrawal of approval of State program

(c) (1) Not later than ninety days after the date on which a State has submitted a program (or revision thereof) pursuant to subsection (b) of this section, the Administrator shall suspend the issuance of permits under subsection (a) of this section as to those navigable waters subject to such program unless he determines that the State permit program does not meet the requirements of subsection (b) of this section or does not conform to the guidelines issued under section 1314(h) (2) of this title. If the Administrator so determines, he shall notify the State of any revisions or modifications necessary to conform to such requirements or guidelines.

(2) Any State permit program under this section shall at all times be in accordance with this section and guide-

lines promulgated pursuant to section 1314(h) (2) of this title.

(3) Whenever the Administrator determines after public hearing that a State is not administering a program approved under this section in accordance with requirements of this section, he shall so notify the State and, if appropriate corrective action is not taken within a reasonable time, not to exceed ninety days, the Administrator shall withdraw approval of such program. The Administrator shall not withdraw approval of any such program unless he shall first have notified the State, and made public, in writing, the reasons for such withdrawal.

Notification of Administrator

(d) (1) Each State shall transmit to the Administrator a copy of each permit application received by such State and provide notice to the Administrator of every action related to the consideration of such permit application, including each permit proposed to be issued by such State.

(2) No permit shall issue (A) if the Administrator within ninety days of the date of his notification under subsection (b) (5) of this section objects in writing to the issuance of such permit, or (B) if the Administrator within ninety days of the date of transmittal of the proposed permit by the State objects in writing to the issuance of such permit as being outside the guidelines and requirements of this chapter.

(3) The Administrator may, as to any permit application, waive paragraph (2) of this subsection.

Waiver of notification requirement

(e) In accordance with guidelines promulgated pursuant to subsection (h) (2) of section 1314 of this title, the Administrator is authorized to waive the requirements of subsection (d) of this section at the time he approves a program pursuant to subsection (b) of this section for any

category (including any class, type, or size within such category) of point sources within the State submitting such program.

Point source categories

(f) The Administrator shall promulgate regulations establishing categories of point sources which he determines shall not be subject to the requirements of subsection (d) of this section in any State with a program approved pursuant to subsection (b) of this section. The Administrator may distinguish among classes, types, and sizes within any category of point sources.

Other regulations for safe transportation, handling, carriage, storage, and stowage of pollutants

(g) Any permit issued under this section for the discharge of pollutants into the navigable waters from a vessel or other floating craft shall be subject to any applicable regulations promulgated by the Secretary of the department in which the Coast Guard is operating, establishing specifications for safe transportation, handling, carriage, storage, and stowage of pollutants.

Violation of permit conditions; restriction or prohibition upon introduction of pollutant by source not previously utilizing treatment works

(h) In the event any condition of a permit for discharges from a treatment works (as defined in section 1292 of this title) which is publicly owned is violated, a State with a program approved under subsection (b) of this section or the Administrator, where no State program is approved, may proceed in a court of competent jurisdiction to restrict or prohibit the introduction of any pollutant into such treatment works by a source not utilizing such treatment works prior to the finding that such condition was violated.

Federal enforcement not limited

(i) Nothing in this section shall be construed to limit the authority of the Administrator to take action pursuant to section 1319 of this title.

Public information

(j) A copy of each permit application and each permit issued under this section shall be available to the public. Such permit application or permit, or portion thereof, shall further be available on request for the purposes of reproduction.

Compliance with permits

(k) Compliance with a permit issued pursuant to this section shall be deemed compliance, for purposes of sections 1319 and 1365 of this title, with sections 1311, 1312, 1316, 1317, and 1343 of this title, except any standard imposed under section 1317 of this title for a toxic pollutant injurious to human health. Until December 31, 1974, in any case where a permit for discharge has been applied for pursuant to this section, but final administrative disposition of such application has not been made, such discharge shall not be a violation of (1) section 1311, 1316, or 1342 of this title, or (2) section 407 of this title, unless the Administrator or other plaintiff proves that final administrative disposition of such application has not been made because of the failure of the applicant to furnish information reasonably required or requested in order to process the application. For the 180-day period beginning on October 18, 1972, in the case of any point source discharging any pollutant or combination of pollutants immediately prior to such date of enactment which source is not subject to section 407 of this title, the discharge by such source shall not be a violation of this chapter if such a source applies for a permit for discharge pursuant to this section within such 180-day period.

§ 1362 [502]. General Definitions

Except as otherwise specifically provided, when used in this Act:

(1) The term "State water pollution control agency" means the State agency designated by the Governor having responsibility for enforcing State laws relating to the abatement of pollution.

(2) The term "interstate agency" means an agency of two or more States established by or pursuant to an agreement or compact approved by the Congress, or any other agency of two or more States, having substantial powers or duties pertaining to the control of pollution as determined and approved by the Administrator.

(3) The term "State" means a State, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Trust Territory of the Pacific Islands.

(4) The term "municipality" means a city, town, borough, county, parish, district, association, or other public body created by or pursuant to State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of this Act.

(5) The term "person" means an individual, corporation, partnership, association, State, municipality, commission, or political subdivision of a State, or any interstate body.

(6) The term "pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. This term does not mean (A) "sewage from vessels" within the meaning of section 312 of this Act; or (B) water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil or gas production and disposed of in a well, if the well used

either to facilitate production or for disposal purposes is approved by authority of the State in which the well is located, and if such State determines that such injection or disposal will not result in the degradation of ground or surface water resources.

(7) The term "navigable waters" means the waters of the United States, including the territorial seas.

(8) The term "territorial seas" means the belt of the seas measured from the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters, and extending seaward a distance of three miles.

(9) The term "contiguous zone" means the entire zone established or to be established by the United States under article 24 of the Convention of the Territorial Sea and the Contiguous Zone.

(10) The term "ocean" means any portion of the high seas beyond the contiguous zone.

(11) The term "effluent limitation" means any restriction established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance.

(12) The term "discharge of a pollutant" and the term "discharge of pollutants" each means (A) any addition of any pollutant to navigable waters from any point source, (B) any addition of any pollutant to the waters of the contiguous zone or the ocean from any point source other than a vessel or other floating craft.

(13) The term "toxic pollutant" means those pollutants, or combinations of pollutants, including disease-causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will, on the basis of information available to the Administrator, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring.

(14) The term "point source" means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.

(15) The term "biological monitoring" shall mean the determination of the effects on aquatic life, including accumulation of pollutants in tissue, in receiving waters due to the discharge of pollutants (A) by techniques and procedures, including sampling of organisms representative of appropriate levels of the food chain appropriate to the volume and the physical, chemical, and biological characteristics of the effluent, and (B) at appropriate frequencies and locations.

(16) The term "discharge" when used without qualification includes a discharge of a pollutant, and a discharge of pollutants.

(17) The term "schedule of compliance" means a schedule of remedial measures including an enforceable sequence of actions or operations leading to compliance with an effluent limitation, other limitation, prohibition, or standard.

(18) The term "industrial user" means those industries identified in the Standard Industrial Classification Manual, Bureau of the Budget, 1967, as amended and supplemented, under the category "Division D—Manufacturing" and such other classes of significant waste producers as, by regulation, the Administrator deems appropriate.

(19) The term "pollution" means the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water.

§ 1365 [505]. Citizen suits—Authorization: jurisdiction

(a) Except as provided in subsection (b) of this section, any citizen may commence a civil action on his own behalf—

(1) against any person (including (i) the United States, and (ii) any other governmental instrumental-

ity or agency to the extent permitted by the eleventh amendment to the Constitution) who is alleged to be in violation of (A) an effluent standard or limitation under this chapter or (B) an order issued by the Administrator or a State with respect to such a standard or limitation, or

(2) against the Administrator where there is alleged a failure of the Administrator to perform any act or duty under this chapter which is not discretionary with the Administrator.

The district courts shall have jurisdiction, without regard to the amount in controversy or the citizenship of the parties, to enforce such an effluent standard or limitation, or such an order, or to order the Administrator to perform such act or duty, as the case may be, and to apply any appropriate civil penalties under section 1319(d) of this title.

Notice

(b) No action may be commenced—

(1) under subsection (a) (1) of this section—

(A) prior to sixty days after the plaintiff has given notice of the alleged violation (i) to the Administrator, (ii) to the State in which the alleged violation occurs, and (iii) to any alleged violator of the standard, limitation, or order, or

(B) if the Administrator or State has commenced and is diligently prosecuting a civil or criminal action in a court of the United States, or a State to require compliance with the standard, limitation, or order, but in any such action in a court of the United States any citizen may intervene as a matter of right.

(2) under subsection (a) (2) of this section prior to sixty days after the plaintiff has given notice of such action to the Administrator,

except that such action may be brought immediately after such notification in the case of an action under this section respecting a violation of sections 1316 and 1317(a) of this title. Notice under this subsection shall be given in such manner as the Administrator shall prescribe by regulation.

Venue; intervention by Administrator

(c) (1) Any action respecting a violation by a discharge source of an effluent standard or limitation or an order respecting such standard or limitation may be brought under this section only in the judicial district in which such source is located.

(2) In such action under this section, the Administrator, if not a party, may intervene as a matter of right.

Litigation costs

(d) The court, in issuing any final order in any action brought pursuant to this section, may award costs of litigation (including reasonable attorney and expert witness fees) to any party, whenever the court determines such award is appropriate. The court may, if a temporary restraining order or preliminary injunction is sought, require the filing of a bond or equivalent security in accordance with the Federal Rules of Civil Procedure.

Statutory or common law rights not restricted

(e) Nothing in this section shall restrict any right which any person (or class of persons) may have under any statute or common law to seek enforcement of any effluent standard or limitation or to seek any other relief (including relief against the Administrator or a State agency).

Effluent standard or limitation

(f) For purposes of this section, the term "effluent standard or limitation under this chapter" means (1) effective July 1, 1973, an unlawful act under subsection (a) of section 1311 of this title; (2) an effluent limitation or other limitation under section 1311 or 1312 of this title; (3) standard of performance under section 1316 of this title; (4) prohibition, effluent standard or pretreatment standards under section 1317 of this title; (5) certification under

section 1341 of this title; or (6) a permit or condition thereof issued under section 1342 of this title, which is in effect under this chapter (including a requirement applicable by reason of section 1323 of this title).

Citizen

(g) For the purposes of this section the term "citizen" means a person or persons having an interest which is or may be adversely affected.

Civil action by State Governors

(h) A Governor of a State may commence a civil action under subsection (a) of this section, without regard to the limitations of subsection (b) of this section, against the Administrator where there is alleged a failure of the Administrator to enforce an effluent standard or limitation under this chapter the violation of which is occurring in another State and is causing an adverse effect on the public health or welfare in his State, or is causing a violation of any water quality requirement in his State.

§ 1369 [509]. Administrative procedure and judicial review

(a) (1) For purposes of obtaining information under section 1315 of this title, or carrying out section 1367(e) of this title, the Administrator may issue subpenas for the attendance and testimony of witnesses and the production of relevant papers, books, and documents, and he may administer oaths. Except for effluent data, upon a showing satisfactory to the Administrator that such papers, books, documents, or information or particular part thereof, if made public, would divulge trade secrets or secret processes, the Administrator shall consider such record, report, or information or particular portion thereof confidential in accordance with the purposes of section 1905 of Title 18, except that such paper, book, document, or information may be disclosed to other officers, employees, or authorized representatives of the United States concerned with carrying out this chapter, or when relevant in any proceeding under this chapter. Witnesses summoned shall be paid the same fees and mileage that are paid witnesses in the courts of the United States. In case of contumacy or refusal to obey a subpena served upon any person under this subsection, the district court of the United States for any district in which such person is found or resides or transacts business, upon application by the United States and after notice to such person, shall have jurisdiction to issue an order requiring such person to appear and give testimony before the Administrator, to appear and produce papers, books, and documents before the Administrator, or both, and any failure to obey such order of the court may be punished by such court as a contempt thereof.

(2) The district courts of the United States are authorized, upon application by the Administrator, to issue subpenas for attendance and testimony of witnesses and the production of relevant papers, books, and documents, for purposes of obtaining information under sections 1314(b) and (c) of this title. Any papers, books, documents, or other information or part thereof, obtained by reason of such a subpena shall be subject to the same requirements as are provided in paragraph (1) of this subsection.

(b) (1) Review of the Administrator's action (A) in promulgating any standard of performance under section 1316 of this title, (B) in making any determination pursuant to section 1316(b) (1) (C) of this title, (C) in promulgating any effluent standard, prohibition, or pretreatment standard under section 1317 of this title, (D) in making any determination as to a State permit program submitted under section 1342(b) of this title, (E) in approving or promulgating any effluent limitation or other limitation under section 1311, 1312, or 1316 of this title, and (F) in issuing or denying any permit under section 1342 of this title, may be had by any interested person in the Circuit Court of Appeals of the United States for the Federal judicial district in which such person resides or

transacts such business upon application by such person. Any such application shall be made within ninety days from the date of such determination, approval, promulgation, issuance or denial, or after such date only if such application is based solely on grounds which arose after such ninetieth day.

(2) Action of the Administrator with respect to which review could have been obtained under paragraph (1) of this subsection shall not be subject to judicial review in any civil or criminal proceeding for enforcement.

(c) In any judicial proceeding brought under subsection (b) of this section in which review is sought of a determination under this chapter required to be made on the record after notice and opportunity for hearing, if any party applies to the court for leave to adduce additional evidence, and shows to the satisfaction of the court that such additional evidence is material and that there were reasonable grounds for the failure to adduce such evidence in the proceeding before the Administrator, the court may order such additional evidence (and evidence in rebuttal thereof) to be taken before the Administrator, in such manner and upon such terms and conditions as the court may deem proper. The Administrator may modify his findings as to the facts, or make new findings, by reason of the additional evidence so taken and he shall file such modified or new findings, and his recommendation, if any, for the modification or setting aside of his original determination, with the return of such additional evidence.

APPENDIX B

Regulations Involved

"EFFLUENT LIMITATIONS GUIDELINES" FOR THE INORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY

The rulemaking order promulgating the foregoing regulations is found at 39 *Fed. Reg.* 9611-9639 (March 12, 1974), Administrative Record, 5395-5419. The preamble of the order and the text of the regulations for the eleven challenged subcategories are as follows:

Title 40—Protection of Environment

CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

Subchapter N—Effluent Guidelines and Standards

PART 415—INORGANIC CHEMICALS MANUFACTURING POINT SOURCE CATEGORY

On October 11, 1973 notice was published in the FEDERAL REGISTER, (38 FR 28174), that the Environmental Protection Agency (EPA or Agency) was proposing effluent limitations guidelines for existing sources and standards of performance and pretreatment standards for new sources within the aluminum chloride production subcategory, aluminum sulfate production subcategory, calcium carbide production subcategory, calcium chloride production subcategory, calcium oxide and hydroxide production subcategory, chlorine and sodium or potassium hydroxide production subcategory, hydrochloric acid production subcategory, hydrofluoric acid production subcategory, hydrogen peroxide production subcategory, nitric acid production subcategory, potassium metal production subcategory, potassium dichromate production subcategory, potassium sulfate production subcategory, sodium bicarbonate production subcategory, sodium carbonate production subcategory, sodium chloride production subcategory, sodium dichromate and sodium sulfate production subcategory, sodium metal production subcategory, sodium silicate pro-

duction subcategory, sodium sulfite production subcategory, sulfuric acid production subcategory, and titanium dioxide production subcategory of the inorganic chemicals manufacturing category of point sources.

The purpose of this notice is to establish final effluent limitations guidelines for existing sources and standards of performance and pretreatment standards for new sources in the inorganic chemicals manufacturing category of point sources, by amending 40 CFR Chapter I, Subchapter N, to add a new Part 415. This final rulemaking is promulgated pursuant to sections 301, 304(b) and (c), 306(b) and (c) and 307(c) of the Federal Water Pollution Control Act, as amended, (the Act); 33 U.S.C. 1251, 1311, 1314(b) and (c), 1316(b) and (c) and 1317(c); 86 Stat. 816 et seq.; Pub. L. 92-500. Regulations regarding cooling water intake structures for all categories of point sources under section 316(b) of the Act will be promulgated in 40 CFR Part 402.

In addition, the EPA is simultaneously proposing a separate provision which appears in the proposed rules section of the FEDERAL REGISTER, stating the application of the limitations and standards set forth below to users of publicly owned treatment works which are subject to pretreatment standards under section 307(b) of the Act. The basis of that proposed regulation is set forth in the associated notice of proposed rulemaking.

The legal basis, methodology and factual conclusions which support promulgation of this regulation were set forth in substantial detail in the notice of public review procedures published August 6, 1973 (38 FR 21202) and in the notice of proposed rulemaking for the aluminum chloride production subcategory, aluminum sulfate production subcategory, calcium carbide production subcategory, calcium chloride production subcategory, calcium oxide and hydroxide production subcategory, chlorine and sodium or potassium hydroxide production subcategory, hydrochloric acid production subcategory, hydrofluoric

acid production subcategory, hydrogen peroxide production subcategory, nitric acid production subcategory, potassium metal production subcategory, potassium dichromate production subcategory, potassium sulfate production subcategory, sodium bicarbonate production subcategory, sodium carbonate production subcategory, sodium chloride production subcategory, sodium dichromate and sodium sulfate production subcategory, sodium metal production subcategory, sodium silicate production subcategory, sodium sulfite production subcategory, sulfuric acid production subcategory, and titanium dioxide production subcategory. In addition, the regulations as proposed were supported by two other documents; (1) The document entitled "Development Document for Proposed Effluent Limitations Guidelines and New Source Performance Standards for the major inorganic products Segment of the Inorganic Chemicals Manufacturing Point Source Category" (August 1973) and (2) the document entitled "Economic Analysis of Proposed Effluent Guidelines, Inorganic Chemicals, Alkali and Chlorine Industries (Major Products) (August, 1973). Both of these documents were made available to the public and circulated to interested persons at approximately the time of publication of the notice of proposed rulemaking.

Interested persons were invited to participate in the rulemaking by submitting written comments within 30 days from the date of publication. Prior public participation in the form of solicited comments and responses from the States, Federal agencies, and other interested parties were described in the preamble to the proposed regulation. The EPA has considered carefully all of the comments received and a discussion of these comments with the Agency's response thereto follows. The regulation as promulgated contains some significant departures from the proposed regulation. The following discussion outlines the reasons why these changes were made and why other suggested changes were not made.

Summary of Major Comments

The following responded to the request for written comments which was contained in the preamble to the proposed regulation: Airco Carbide, Allied Chemical Corporation, American Cyanamid Company, American Smelting & Refining Company, Atomic Energy Commission, BASF Wyandotte Corporation, B. F. Goodrich Chemical Company, California—State Water Resources Control Board, Chemetron Corporation, County Sanitation Districts of L.A. County, Detrex Chemical Industries, Diamond Shamrock Chemical Company, Dow Chemicals USA, E. I. DuPont de Nemours & Company, EPA Region VIII, Ferroallays Association, Georgia-Pacific Corporation, Great Salt Lake Minerals & Chemicals Corporation, Hooker-Industrial Chemical Division, Kaiser Aluminum & Chemical Corporation, Kerr-McGee Chemical Corporation, Leslie Salt Company, Lowry Associates, Manufacturing Chemists Association, Michigan Chemical Corporation, Midwest Carbide Corporation, Monsanto, National Paint & Coating Association, NL Industries, Titanium Pigments Operations, N.J. Zinc Company (Bethlehem, Pa.), N.J. Zinc Company (Gloucester, N.J.), Olin Chemicals, Pacific Carbide & Alloys Company, Pennwalt Corporation, Philadelphia Quartz Company, Pittsburgh Plate Glass Industries, Salt Institute, San Francisco Bay Conservation & Development Commission, SMC Glidden-Durkee, State of Michigan—Department of Natural Resources, State of N.Y. Department of Environmental Conservation, State of Utah—Attorney General, State of Utah—Department of Natural Resources, State of Utah—Department of Social Services, Stauffer Chemical Company, The Chlorine Institute, Inc., Texas Chemical; Union Carbide Corporation, U.S. Department of Commerce, U.S. Department of the Interior, Vulcan Materials Company, Water Pollution Control Federation and Western Salt Company. The following is a summary of the significant comments and the Agency's response to those comments.

(1) Because of wide variations in plant age and size, product mix, manufacturing processes, and raw materials,

the guidelines should be expressed as ranges. Many commenters recommended adoption of ESWQIAC's proposed methodology.

The approach taken in developing effluent limitations guidelines standards of performance for the inorganic chemicals manufacturing industry was to examine all variables and segment the industry into workable subcategories consistent with these variations. Twenty-two subcategories have been established based on the chemical product manufactured. In cases where two dissimilar processes are used to manufacture the same product, separate limitations have been established within the subcategory. Thus, ranges are provided for, as are other factors, by segmenting the inorganic chemicals manufacturing point source category into discrete subcategories, each with its own limitation. ESWQIAC's proposal is under evaluation as a contribution toward future refinements on guidelines for some industries. The committee has indicated that their proposed methodology could not be developed in sufficient time to be available for the current phase of guideline promulgation, which is proceeding according to a court-ordered schedule. Its present state of development does not provide sufficient evidence to warrant the Agency's delaying issuance of any standard in hopes that an alternative approach might be preferable.

(2) Many commenters stated that a guideline requiring "no discharge of process waste water pollutants" is ambiguous. Also, they stated that the definition of "pollutant" should clearly exclude innocuous dissolved solids, such as chlorides and sulfates.

The terms "process waste water", "process waste water pollutants", and "discharge of pollutant(s)" are clearly defined in 40 CFR Part 401. Reference to these definitions is included whenever these terms are used. "No" discharge of process waste water pollutants to navigable waters means that process waste water pollutants may not be discharged to navigable water in quantities greater than

the detectable limits using the test methods presented in 40 CFR 136 "Guidelines establishing test procedures for the analysis of pollutants" published in the FEDERAL REGISTER, October 16, 1973. The term "pollutant(s)" as defined in 40 CFR Part 401 includes all dissolved materials, such as chlorides and sulfate. Where a discharge of process waste water pollutants has been allowed for chemical subcategories, it was concluded that only the selected pollutant parameters could be economically limited by technology-based standards. In some cases, however, where total recycle, sale, recovery, or reuse of process waste water is technically and economically feasible, the discharge of all process waste water pollutants has been limited.

(3) Some comments stated that the proposed pretreatment standards preclude industrial use of public treatment works.

The methodology for applying effluent limitation guidelines to discharges from point sources to municipal treatment systems has been given further consideration by the Agency. The pollutants present in the waste water generated by the manufacture of inorganic chemicals have been identified. Discharge of these pollutants to municipal treatment systems is allowed in limited quantities so as to ensure adequate treatment and to prevent interference with the performance of such a system. These pretreatment standards for existing point sources are being proposed as an amendment to 40 CFR Part 415.

(4) Many commenters stated that the cost estimates were low and did not include costs for auxiliary equipment, land acquisitions, sludge disposal, or research and development work. Additionally, it was said that the impact of these costs has been understated.

Cost information was obtained directly from industry during plant visits, from engineering firms and equipment suppliers, and from available literature. This data has been obtained from the best sources available to the Agency

and is believed to be representative of actual capital and operating costs.

In cases where commenters have supplied additional cost data, satisfactorily documented and detailed, to indicate that the initial estimates are low, the figures have been revised and the proposed guidelines altered accordingly. Consideration has also been given to comments questioning the magnitude of the projected economic impact. Specific comments are summarized for the chemical subcategory to which they apply.

(5) Some commenters questioned the use of a factor of two to relate daily maximums to 30-day averages.

Extensive, long-term data is not available for each of the 22 chemical subcategories. It was necessary, therefore, to rely on data from other segments of the inorganic chemicals industry, as well as data from other industrial categories. Based on this information and using good engineering judgement on the performance reliability of recommended treatment systems, a factor of two appears generous.

(6) Many commenters said that limitations should be clearly defined as representing the net pollutant contributions as a result of the specific manufacturing process being limited. They question whether allowances should be made for pollutants present in the intake water.

If not otherwise specified, the effluent limitation numbers in this regulation will be applied as absolute discharge limitations. The use of such absolute limitations is generally appropriate since the concentration of a pollutant remaining after the application of a given treatment technology is relatively independent of minor variations in the pollutant concentration in the waste or the source of the pollutant. EPA intends to amend the NPDES regulations to take into account, when appropriate, pollutants already existing in the stream, so that in certain cases an effluent limitation may be adjusted to take into account pollutants

entering with a discharger's supply providing the water is withdrawn from the same source into which it is discharged. If the source is other than the receiving waterbody, the effluent standards will be applied as absolute limitations without adjustment.

(7) Aluminum chloride. Some commenters said that a market may not exist for the scrubber water (a 28 percent aluminum chloride solution) and that costs to purify and concentrate the solution may be prohibitive. They recommend a discharge allowance be made for the scrubber waste water effluent.

Only "yellow grade" aluminum chloride, made with an excess of chlorine, requires wet scrubbing techniques on the gaseous waste stream. Two plants, representing approximately 40 percent of the total annual production of aluminum chloride, currently are able to sell their dilute scrubber solution. A re-evaluation of the costs to concentrate the dilute scrubber solution indicates that costs for concentration are approximately 0.4 percent of the selling price of aluminum chloride.

(8) Aluminum sulfate. Some commenters stated that recycle of leaks and spills may contaminate high purity grades of product. Also, aluminum clays may be used as the raw material in place of bauxite which significantly effects the raw waste load. The commenters said that area for ponds may not be available at all locations. Also, net rainfall will preclude the use of ponds. When a dry product is produced, some commenters questioned whether recycling water increases the evaporative load on equipment, increasing energy requirements.

The wastes generated in refining bauxite to produce on iron-free hydrated alumina material are not considered to be process waste water pollutants resulting from the manufacture of iron-free aluminum sulfate. Process waste water pollutants generated by the refinement of bauxite ore are subject to the effluent guidelines to be promulgated in 40 CFR 421. If these wastes are segregated from leaks and

spills, contamination preventing recycle is not a problem. Other raw materials than bauxite, including clays and aluminum hydrate, generate greater quantities of raw waste because of impurities, but the waste water constituents are similar and the process is the same. Thus, although the use of different raw materials affects the raw waste load, it does not preclude the use of settling, clarification, and reuse of process waste water as recommended. The guidelines do not require plants to use large ponds to achieve no discharge of process waste water pollutants. Clarifiers may be used in locations where land is not available for funding. The costs for clarifiers are similar to the costs for ponding. A provision has been established to allow discharge from impoundments under some conditions of high rainfall.

(9) Calcium carbide. Calcium carbide manufacturers stated that it should be considered a ferroalloy because: (a) air standards consider it a ferroalloy; (b) all plants are members of Ferroalloy Assoc.; (c) it is usually made in complexes with ferroalloys; (d) it uses similar processes in similar ovens. Commentors also expressed concern that the only two plants achieving the proposed guidelines are unique, using an uncovered furnace. Other plants recover gaseous carbon monoxide and must scrub the gas to remove impurities. Because of high temperatures dry bag collection of dust is not feasible.

A portion of calcium carbide is produced in both the ferroalloy industry and the inorganic chemicals industry. The regulation presented herein is applicable to discharges from calcium carbide production in open furnaces. Plants employing this manufacturing process are not located in ferroalloy complexes. Effluent limitations for waste water discharges from calcium carbide production in covered furnaces will be established in a forthcoming regulation as part of the ferroalloy industry. This distinction will accommodate differences in process waste water from plants using open furnaces and those using covered furnaces.

(10) Calcium oxide and calcium hydroxide. Many commenters mentioned that costs for converting to a dry bag house from a wet scrubber system are economically unjustified. They also state that reuse of the water is not possible because of impurities.

The guidelines do not require conversion to a dry air pollution abatement system. An alternate treatment system consists of settling suspended solids and total recycle of the supernatant to the scrubbing system. At least one lime plant currently employs this treatment system to achieve the guidelines.

(11) Chlorine. Some commenters pointed out the fact that the proposed mercury limit for the mercury cell process is not achievable using the best practicable technology and that the location of mercury monitoring should be clearly specified as leaving the mercury treatment facility. They further state that no discharge of process waste water pollutants is not demonstrated in plants using either the diaphragm or mercury cell process and appears to be technically impossible. It should definitely not be required of new sources. Some commenters said that the lead limitation appears to be unachievable. They state that there is no rationale for having a more stringent TSS limitation on diaphragm cell plants than mercury cell plants.

While three plants are currently meeting the proposed guidelines, supplied data indicates that the proposed mercury limitation is not being achieved in certain plants employing the best practicable control technology currently available. The standard has been revised, considering the effluent reduction achieved by a greater number of plants. The limitation is intended to indicate mercury levels in the waste stream from the mercury treatment facility because mercury residuals may not be controllable. This is clearly stated in 40 CFR 415.61. The presence of lead in the effluent from diaphragm cell plants results from the development of cracks around protective resin seals which encase underlying lead mountings. Currently, one-third of the

industry is using anodes which do not require lead mountings. Industry representatives state that another one-third are seriously considering conversion. The lead limitation is the average value discharged from three plants which have not converted to lead-free anodes. The new sources performance standards of no discharge of process waste water pollutants is not presently demonstrated, and research and development may require several years. Therefore, new sources will be required to meet the best performance demonstrated in exemplary plants. The suspended solids limitation has been reevaluated for discharges from the diaphragm cell process.

(12) Many commenters stated that a provision should be established to allow for the discharge of leaks, spills, and washdown waste waters.

Spills, leaks, and washdown waste waters may be minimized or eliminated by good housekeeping, operation, and maintenance. The process waste water should be segregated from other waste streams and may be collected and fed back into the manufacturing process.

(13) Sulfuric acid. Some commenters stated that single adsorption plants can not eliminate their scrubber effluent, leaks and spills, or start-up and shut-down waste waters.

Good housekeeping, operation and equipment maintenance will minimize the volume of waste waters to a point where reuse or sale of the recovered acid product is feasible.

(14) Hydrogen peroxide—organic process. Some commenters said that total process waste water recycle is not possible because of organic impurities present in the waste streams.

The technology to achieve no discharge of process waste water pollutants is considered to be best available and best demonstrated technology. Organic solvents of the type used in the manufacturing process can be removed by skimming and carbon adsorption treatment. Best prac-

ticable technology consists of oil separation and clarification, treatments presently used in the industry to attain the required pollutant reductions.

(15) Potassium dichromate. Some commenters mentioned that replacement of barometric condensers with noncontact heat exchangers has not been demonstrated and should not be required by 1977. They also questioned whether reuse of sodium dichromate is possible in all plants.

Recycle of unreacted sodium dichromate is technically possible in all plants if segregation of waste streams and good housekeeping is practiced. Conversion to noncontact heat exchangers is being accomplished in the potassium dichromate industry. Noncontact heat exchangers are widely used and have been a proven technology in the chemical industry for many years.

(16) Sodium. Commenters stated that TSS removals to less than 50 mg/l have not been demonstrated in waste streams resulting from sodium manufacturing.

The technologies required to achieve the proposed TSS limitation are widely demonstrated. These alternatives include sedimentation, flocculation, and clarification. The suspended solids are primarily the decomposition products of the cells and alkaline salts.

(17) Sodium sulfite. Several comments stated that no discharge of process waste water pollutants is based upon recovery of sodium sulfate which is not possible because of a limited market. Also, wastes contain impurities other than sulfates. Returning these impurities to the process is not possible. Some commenters said that the COD limitation is confusing.

The COD limitation is in the units recommended in Standard Methods for Waste Water Analysis. The guidelines do not require the sale of sodium sulfate. Satisfactory land disposal of the unused sodium sulfate would cost approximately two percent of the selling price of sodium

sulfite. The waste waters may be segregated, treated and recycled to the process.

(18) Sodium carbonate. Some commenters stated that gravity sedimentation will not reduce the suspended solids concentration to the recommended 25 mg/l concentration. They say particles are very fine and a filter precoat is required. A small suspended solids reduction is not justified by the cost. Various manufacturers recommend using a suspended solids concentration of 50 mg/l as it is compatible with actual settling pond performance and is a more "realistic and achievable level".

The treatment technologies required to attain the affluent pollutant reduction proposed are conventional and proven treatment systems. Treatment alternatives include sedimentation basins, flocculators and clarifiers.

(19) Sodium dichromate. Some commenters mentioned that technology has not been demonstrated to achieve no discharge of process waste water pollutants and that it is technically impossible. The 1977 standard is based on a plant which is only two years old. Commentors question whether existing plants can economically achieve its effluent quality.

The control technology used at the exemplary plant consists of leak and spill containment and pickle liquor treatment for chromium reduction followed by sedimentation to achieve the proposed guidelines. Another plant uses conventional sodium hydrosulfide treatment and lime to attain the proposed chromium levels. The proposed effluent limitations can be attained in existing facilities. The proposed new source performance standards were based on evaporation to attain no discharge of process waste water pollutants. Considering nonwater environmental aspects, the new source performance standards have been revised to require good water conservation and best practicable technology.

(20) Sodium chloride. Commentors stated that most plants return unused bitterns to the source. They feel that

discharges do not threaten aquatic life or contribute to water pollution and that recovery of potassium and magnesium salts is not economical.

Although some plants may have ample land to store waste bitterns, this treatment is not universally applicable. Alternative means to achieve no discharge of process waste water pollutants are economically prohibitive. If no pollutants are added to the waste bitterns, return of the unused salts to the source is a reasonable limitation for technology-based standards.

(21) Sodium Silicate. Some comments stated that sodium hydroxide, sodium sulfate, and silica should not be considered pollutants. Because of their natural occurrence in most waters, costs to achieve no discharge of these compounds are not justified. They further state that recycle is not possible because of turbidity problems and evaporation ponds are not universally applicable.

A reexamination of initial data and consideration of substantial comments indicate that cost of treatment to achieve no discharge of process waste water pollutants may not be justified for a 1977 standard. Best practicable technology has been redefined as a well-designed and operated settling basin.

(22) Titanium dioxide. Several commenters stated that the costs to achieve the proposed limitations place a greater financial burden on titanium dioxide producers using the sulfate process than those using the chloride process. They say that this economic inequity may force some sulfate process plants to close down because of their inability to recover treatment costs while maintaining competitive prices. It was stated that polishing filtration is necessary to achieve the suspended solids limitations for discharges from the sulfate process. The commenters said that some of the pollutant parameters selected as the subject of effluent guidelines should be eliminated. Industry further stated that the flow basis of 100,000 1/kkg for the sulfate process is not achievable. Several commenters question

the use of "dissolved iron" as the means to limit iron. They feel "total iron" should be used so as to include the total quantities of iron being discharged regardless of its state.

(i) Chloride Process. A re-evaluation of the pollutant parameters selected indicates that effluent standards for metals other than iron are not necessary requirements to establish compliance with best practicable technology currently available. While monitoring aluminum, lead, etc., provides for stricter effluent control, these metals are present only in small quantities relative to the iron content. They are removed to acceptable levels if the iron limitation is maintained. The guidelines represent the quantities of pollutants which may be discharged based on treatment technology. The recommended treatment includes iron precipitation and clarification. The efficiency of this treatment may be best determined by measuring the total iron content of the effluent. Data from this type of treatment indicates that a effluent containing 4 mg/l total iron can be achieved.

(ii) Sulfate process. Inclusion of effluent limitations for suspended solids, pH, and iron are sufficient to ensure compliance with the effluent reduction attainable through the application of the required levels of treatment technology. Other waste water constituents appear in relatively minor quantities and are adequately removed when the iron limitation is achieved. The rationale presented above for using the parameter "total iron" is applicable to the sulfate process also. The process waste water flow basis of 100,000 1/kkg has been re-examined. Based on initial data and comments received this basis has been revised. A total process waste water flow of 210,000 1/kkg of product is achievable using recycle of scrubber water. Detailed data have been supplied subsequent to the publication of the proposed regulations. These data indicate the costs to reduce the TSS concentration to 25 mg/1 are greater than initially estimated. Considering the nature of the solids and the expected performance from the recommended

treatment system a concentration basis of 50 mg/1 is reasonable for a 1977 standard.

(23) Some commenters said that provisions should be established to allow for discharges from treatment or holding ponds in the event of catastrophic rain storms.

For chemicals subcategories which have a limitation of no discharge of process waste water pollutants to navigable waters and for which ponds may be part of the treatment system, an allowance has been provided to permit a discharge of process waste water from a plant located in an area where rainfall exceeds the evaporation rate or in the event of a catastrophic rainfall.

Revision of the Proposed Regulation Prior to Promulgation

As a result of public comment and continuing review and evaluation of the proposed regulation by EPA, the following changes have been made in the regulation.

(1) The applicability of the proposed regulations for calcium carbide production has been amended to include only calcium carbide production in uncovered furnaces.

(2) The effluent limitation guidelines for sodium chloride production have been amended to allow for the return of unused salt wastes to the body of water from which the brine solution was initially obtained. No additional pollutants may be added to the waste salt solution prior to discharge.

(3) The effluent limitation for sodium silicate production based on the application of best practicable technology currently available has been revised to permit a discharge of small quantities of suspended solids.

(4) The new source performance standards for the sodium dichromate production subcategory and the sodium sulfite production subcategory have been revised to require good water conservation and implementation of the best practicable technology currently available.

(5) The new source performance standards for chlorine production have also been amended to allow for a waste water discharge from both diaphragm and mercury cell plants.

(6) The mercury limitation has been revised for mercury cell chlorine plants based on the effluent reduction attainable by the best practicable technology currently available.

(7) The effluent limitation of suspended solids has been revised for diaphragm cell chlorine plants.

(8) The effluent limitations for titanium dioxide production have been changed to exclude limitations on trace elements. The parameter "total dissolved iron" has been amended to "total iron" and the guideline has been altered accordingly.

(9) The effluent limitations for titanium dioxide production by the sulfate process have been changed. The flow basis has been increased resulting in less stringent limitations on iron and suspended solids.

(10) Minor adjustments have been made to reflect the fact that an increased number of definitions and analytical methods have been included in 40 CFR 401 and are incorporated by reference where applicable.

(11) Section 304(b)(1)(B) of the Act provides for "guidelines" to implement the uniform national standards of section 301(b)(1)(A). Thus Congress recognized that some flexibility was necessary in order to take into account the complexity of the industrial world with respect to the practicability of pollution control technology. In conformity with the Congressional intent and in recognition of the possible failure of these regulations to account for all factors bearing on the practicability of control technology, it was concluded that some provision was needed to authorize flexibility in the strict application of the limitations contained in the regulation where required by special circumstances applicable to individual dischargers. Accord-

ingly, a provision allowing flexibility in the application of the limitations representing best practicable control technology currently available has been added to each subpart, to account for special circumstances that may not have been adequately accounted for when these regulations were developed.

(12) An allowance has been provided to permit the discharge of process waste water pollutants from plants located in areas where precipitation exceeds evaporation. An allowance has also been provided for discharge in the event of a catastrophic rainfall. These allowances are applicable only to chemical subcategories which may utilize ponds to achieve no discharge of process waste water pollutants.

Economic Impact

The changes that were made to the proposed regulations for the inorganic chemicals manufacturing category do not substantially affect the initial economic analysis. The changes detailed above concern new sources and reflect a re-evaluation of the efficiency of various treatment systems. These revisions, however, do not affect the conclusions of the economic impact study.

Cost-Benefit Analysis

The detrimental effects of the constituents of waste waters now discharged by point sources within the major inorganic products segment of the inorganic chemicals manufacturing point source category are discussed in Section VI of the report entitled "Development Document for Effluent Limitations Guidelines for the major inorganic products segment of the Inorganic Chemicals Manufacturing Point Source Category" (August 1974). It is not feasible to quantify in economic terms, particularly on a national basis, the costs resulting from the discharge of these pollutants to our Nation's waterways. Nevertheless, as indicated in Section VI, the pollutants discharged have

substantial and damaging impacts on the quality of water and therefore on its capacity to support healthy populations of wildlife, fish and other aquatic wildlife and on its suitability for industrial, recreational and drinking water supply uses.

The total cost of implementing the effluent limitations guidelines includes the direct capital and operating costs of the pollution control technology employed to achieve compliance and the indirect economic and environmental costs identified in Section VIII and in the supplementary report entitled "Economic Analysis of Proposed Effluent Guidelines Inorganic Chemicals, Alkali and Chlorine Industries (Major Products)" (August 1973). Implementing the effluent limitations guidelines will substantially reduce the environmental harm which would otherwise be attributable to the continued discharge of polluted waste waters from existing and newly constructed plants in the inorganic chemicals manufacturing industry. The Agency believes that the benefits of thus reducing the pollutants discharged justify the associated costs which, though substantial in absolute terms, represent a relatively small percentage of the total capital investment in the industry.

Publication of Information on Processes, Procedures, or Operating Methods Which Result in the Elimination or Reduction of the Discharge of Pollutants

In conformance with the requirements of Section 304 (c), a manual entitled, "Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the MAJOR INORGANIC PRODUCTS Segment of the Inorganic Chemicals Manufacturing Point Source Category," has been published and is available for purchase from the Government Printing Office, Washington, D. C. 20401 for a nominal fee.

Final Rulemaking

In consideration of the foregoing, 40 CFR Chapter I, Subchapter N is hereby amended by adding a new Part 415, Inorganic Chemicals Manufacturing Point Source Category, to read as set forth below. This final regulation is promulgated as set forth below and shall be effective on May 13, 1974.

Dated: March 4, 1974.

JOHN QUARLES,
Acting Administrator.

Subpart A—Aluminum Chloride Production Subcategory

Sec.

415.10 Applicability; description of the aluminum chloride production subcategory.

415.11 Specialized definitions.

415.12 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

415.13 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.14 [Reserved]

415.15 Standards of performance for new sources.

415.16 Pretreatment standards for new sources.

Subpart B—Aluminum Sulfate Production Subcategory

415.20 Applicability; description of the aluminum sulfate production subcategory.

415.21 Specialized definitions.

415.22 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Sec.

415.23 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.24 [Reserved]

415.25 Standards of performance for new sources.

415.26 Pretreatment standards for new sources.

Subpart C—Calcium Carbide Production Subcategory

415.30 Applicability; description of the calcium carbide production subcategory.

415.31 Specialized definitions.

415.32 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

415.33 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.34 [Reserved]

415.35 Standards of performance for new sources.

415.36 Pretreatment standards for new sources.

Subpart D—Calcium Chloride Production Subcategory

415.40 Applicability; description of the calcium chloride production subcategory.

415.41 Specialized definitions.

415.42 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Sec.

415.43 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.44 [Reserved]

415.45 Standards of performance for new sources.

415.46 Pretreatment standards for new sources.

Subpart E—Calcium Oxide and Calcium Hydroxide Production Subcategory

415.50 Applicability; description of the calcium oxide and calcium hydroxide production subcategory.

415.51 Specialized definitions.

415.52 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

415.53 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.54 [Reserved]

415.55 Standards of performance for new sources.

415.56 Pretreatment standards for new sources.

Subpart F—Chlorine and Sodium or Potassium Hydroxide Production Subcategory

415.60 Applicability; description of the chlorine and sodium or potassium hydroxide production subcategory.

415.61 Specialized definitions.

415.62 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Sec.

415.63 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.64 [Reserved]

415.65 Standards of performance for new sources.

415.66 Pretreatment standards for new sources.

Subpart G—Hydrochloric Acid Production Subcategory

415.70 Applicability; description of the hydrochloric acid production subcategory.

415.71 Specialized definitions.

415.72 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

415.73 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.74 [Reserved]

415.75 Standards of performance for new sources.

415.76 Pretreatment standards for new sources.

Subpart H—Hydrofluoric Acid Production Subcategory

415.80 Applicability; description of the hydrofluoric acid production subcategory.

415.81 Specialized definitions.

415.82 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

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415.123 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.124 [Reserved]

415.125 Standards of performance for new sources.

415.126 Pretreatment standards for new sources.

Subpart M—Potassium Sulfate Production Subcategory

415.130 Applicability; description of the potassium sulfate production subcategory.

415.131 Specialized definitions.

415.132 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

415.133 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.134 [Reserved]

415.135 Standards of performance for new sources.

415.136 Pretreatment standards for new sources.

Subpart N—Sodium Bicarbonate Production Subcategory

415.140 Applicability; description of the sodium bicarbonate production subcategory.

415.141 Specialized definitions.

415.142 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

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415.143 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.144 [Reserved]

415.145 Standards of performance for new sources.

415.146 Pretreatment standards for new sources.

Subpart O—Sodium Carbonate Production Subcategory

415.150 Applicability; description of the sodium carbonate production subcategory.

415.151 Specialized definitions.

415.152 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

415.153 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.154 [Reserved]

415.155 Standards of performance for new sources.

415.156 Pretreatment standards for new sources.

Subpart P—Sodium Chloride Production Subcategory

415.160 Applicability; description of the sodium chloride production subcategory.

415.161 Specialized definitions.

415.162 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

415.163 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

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415.164 [Reserved]

415.165 Standards of performance for new sources.

415.166 Pretreatment standards for new sources.

Subpart Q—Sodium Dichromate and Sodium Sulfate Production Subcategory

415.170 Applicability; description of the sodium dichromate and sodium sulfate production subcategory.

415.171 Specialized definitions.

415.172 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

415.173 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.174 [Reserved]

415.175 Standards of performance for new sources.

415.176 Pretreatment standards for new sources.

Subpart R—Sodium Metal Production Subcategory

415.180 Applicability; description of the sodium metal production subcategory.

415.181 Specialized definitions.

415.182 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

415.183 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.184 [Reserved]

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415.185 Standards of performance for new sources.

415.186 Pretreatment standards for new sources.

Subpart S—Sodium Silicate Production Subcategory

415.190 Applicability; description of the sodium silicate production subcategory.

415.191 Specialized definitions.

415.192 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

415.193 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.194 [Reserved]

415.195 Standards of performance for new sources.

415.196 Pretreatment standards for new sources.

Subpart T—Sodium Sulfite Production Subcategory

415.200 Applicability; description of the sodium sulfite production subcategory.

415.201 Specialized definitions.

415.202 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

415.203 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

415.204 [Reserved]

415.205 Standards of performance for new sources.

415.206 Pretreatment standards for new sources.

Subpart U—Sulfuric Acid Production Subcategory

Subpart V—Titanium Dioxide Production Subcategory

AUTHORITY: Secs. 301, 304(b) and (c), 306(b) and (c), 307(c), Pub. L. 92-500; 86 Stat. 816 et seq.; (33 U.S.C. 1251, 1311, 1314(b) and (c), 1316(b) and (c), 1317(c)).

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SUBPART F—CHLORINE AND SODIUM OR POTASSIUM HYDROXIDE PRODUCTION SUBCATEGORY

§ 415.60 Applicability: description of the chlorine and sodium or potassium hydroxide production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of chlorine and sodium or potassium hydroxide by the diaphragm cell process and by the mercury cell process.

§ 415.61 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR 401 shall apply to this subpart.

(b) The term "product" shall mean chlorine.

(c) The term "mercury" shall mean the total mercury present in the process waste water stream exiting the mercury treatment system.

(d) The term "lead" shall mean total lead.

§ 415.62 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology avail-

able, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in this Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The following limitations establish the quantity or quality of pollutants or pollutant properties which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

(a) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste water from chlorine and potassium or sodium hydroxide manufacture by the mercury cell process:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of product)	
TSS	0.64	0.32
Mercury	.00028	.00014
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	0.64	0.32
Mercury	.00028	.00014
pH	Within the range 6.0 to 9.0.	

(b) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste water from chlorine and sodium or potassium hydroxide manufacture by the diaphragm cell process:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of product)	
TSS	0.64	0.32
Lead	.005	.0025
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	0.64	0.32
Lead	.005	.0025
pH	Within the range 6.0 to 9.0.	

§ 415.63 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable.

(a) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste water from chlorine and sodium or potassium hydroxide manufacture by the mercury cell process:

(1) Subject to the provisions of paragraph (a)(2) of this section there shall be no discharge of process waste water pollutants into navigable waters.

(2) A process waste water impoundment which is designed, constructed, and operated so as to contain the precipitation from the 25 year, 24 hour rainfall event as established by the National Climatic Center, National Oceanic and Atmospheric Administration for the area in which such impoundment is located may discharge that volume of process waste water which is equivalent to the volume of precipitation that falls within the impoundment in excess of that attributable to the 25 year, 24 hour rainfall event, when such event occurs.

(b) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste water from chlorine and sodium or potassium hydroxide manufacture by the diaphragm cell process: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.64 [Reserved]

§ 415.65 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties which may be discharged by a new source subject to the provisions of this subpart:

(a) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste water from chlorine and sodium or potassium hydroxide manufacture by the mercury cell process:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of product)	
TSS	0.64	0.32
Mercury	.00014	.00007
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	0.64	0.32
Mercury	.00014	.00007
pH	Within the range 6.0 to 9.0.	

(b) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste water from chlorine and sodium or potas-

sium hydroxide manufacture by the diaphragm cell process:

Effluent characteristic	Effluent limitations: Maximum for any 1 day	Effluent limitations: Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of product)	
TSS	0.64	0.32
Lead	.00008	.00004
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	0.64	0.32
Lead	.00008	.00004
pH	Within the range 6.0 to 9.0.	

§ 415.66 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the chlorine and sodium or potassium hydroxide production subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the navigable waters), shall be the standard set forth in Part 128 of this chapter, except that, for the purpose of this section, § 128.133 of this chapter shall be amended to read as follows:

> In addition to the prohibitions set forth in 40 CFR 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 415.65; *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

SUBPART G—HYDROCHLORIC ACID PRODUCTION SUBCATEGORY

§ 415.70 Applicability; description of the hydrochloric acid production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of hydrochloric acid and by direct reaction of chlorine and hydrogen.

§ 415.71 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR 401 shall apply to this subpart.

§ 415.72 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES per-

mits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.73 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.74 [Reserved]

§ 415.75 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.76 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the hydrochloric acid production subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the navigable waters), shall be the standard set forth in Part 128 of this chapter, except that, for the purpose of this section, § 128.133 of this chapter shall be amended to read as follows:

> In addition to the prohibitions set forth in 40 CFR 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 415.75; *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

SUBPART H—HYDROFLUORIC ACID PRODUCTION SUBCATEGORY

§ 415.80 Applicability; description of the hydrofluoric acid production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of hydrofluoric acid.

§ 415.81 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR 401 shall apply to this subpart.

§ 415.82 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dic-

tated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

(a) Subject to the provisions of paragraphs (b), (c), and (d) of this section, there shall be no discharge of process waste water pollutants into navigable waters.

(b) A process waste water impoundment which is designed, constructed and operated so as to contain the precipitation from the 10 year, 24 hour rainfall event as established by the National Climatic Center, National Oceanic and Atmospheric Administration for the area in which such impoundment is located may discharge that volume of process waste water which is equivalent to the volume of precipitation that falls within the impoundment in excess of that attributable to the 10 year, 24 hour rainfall event, when such event occurs.

(c) During any calendar month there may be discharged from a process waste water impoundment either a volume of process waste water equal to the difference between the precipitation for that month that falls within the impoundment and the evaporation for that month, or, if greater, a volume of process waste water equal to the difference between the mean precipitation for that month that falls within the impoundment and the mean evaporation for that month as established by the National Climatic Center, National Oceanic and Atmospheric Administration for the area in which such impoundment is located (or as otherwise determined if no monthly data have been established by the National Climatic Center).

(d) Any process waste water discharged pursuant to paragraph (c) of this section shall comply with each of the following requirements:

Effluent characteristic	Effluent limitations: Maximum for any 1 day	Effluent limitations: Average of daily values for 30 consecutive days shall not exceed—
	Metric units (milligrams per liter)	
Floride	30	15
TSS	50	25
pH	Within the range 6.0 to 9.0.	
	English units (parts per million)	
Floride	30	15
TSS	50	25
pH	Within the range 6.0 to 9.0.	

§ 415.83 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

(a) Subject to the provisions of paragraph (b) of this section there shall be no discharge of process waste water pollutants into navigable waters.

(b) A process waste water impoundment which is designed, constructed, and operated so as to contain the precipitation from the 25 year, 24 hour rainfall event as

established by the National Climatic Center, National Oceanic and Atmospheric Administration for the area in which such impoundment is located may discharge that volume of process waste water which is equivalent to the volume of precipitation that falls within the impoundment in excess of that attributable to the 25 year, 24 hour rainfall event, when such event occurs.

§ 415.84 [Reserved]

§ 415.85 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart:

(a) Subject to the provisions of paragraph (b) of this section there shall be no discharge of process waste water pollutants into navigable waters.

(b) A process waste water impoundment which is designed, constructed, and operated so as to contain the precipitation from the 25 year, 24 hour rainfall event as established by the National Climatic Center, National Oceanic and Atmospheric Administration for the area in which such impoundment is located may discharge that volume of process waste water which is equivalent to the volume of precipitation that falls within the impoundment in excess of that attributable to the 25 year, 24 hour rainfall event, when such event occurs.

§ 415.86 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the hydrofluoric acid production subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the navigable waters), shall be the standard set forth in Part 128 of this chapter, except that, for the purpose of this

section, § 128.133 of this chapter shall be amended to read as follows:

> In addition to the prohibitions set forth in 40 CFR 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 415.85; *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

SUBPART I—HYDROGEN PEROXIDE PRODUCTION SUBCATEGORY

§ 415.90 Applicability; description of the hydrogen peroxide production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of hydrogen peroxide by the electrolytic process and by the oxidation of alkyl hydroanthraquinones.

§ 415.91 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR 401 shall apply to this subpart.

(b) The term "product" shall mean hydrogen peroxide as a one hundred percent hydrogen peroxide solution.

(c) The term "CyanideA" shall mean those cyanides amenable to chlorination as described in *1972 Annual Book of ASTM Standards*, 1972. Standard D2036-72, Method B, page 553.

§ 415.92 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The following limitations establish the quan-

tity or quality of pollutants or pollutant properties which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

(a) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste water from hydrogen peroxide manufacture by the oxidation of alkyl hydroanthraquinones.

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of product)	
TSS	0.8	0.4
TOC	.44	.22
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	0.8	0.4
TOC	.44	.22
pH	Within the range 6.0 to 9.0.	

(b) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste water from hydrogen peroxide manufacture by the electrolytic process:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of product)	
TSS	0.005	0.0025
Cyanide A	.0004	.0002
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	0.005	0.0025
Cyanide A	.0004	.0002
pH	Within the range 6.0 to 9.0.	

§ 415.93 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

(a) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste water from hydrogen peroxide manufacture by the oxidation of alkyl hydroanthraquinones: there shall be no discharge of process waste water pollutants to navigable waters.

(b) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste water from hydrogen peroxide manufacture by the electrolytic process:

(1) Subject to the provisions of paragraph (b)(2) of this section there shall be no discharge of process waste water pollutants into navigable waters.

(2) A process waste water impoundment which is designed, constructed, and operated so as to contain the precipitation from the 25 year, 24 hour rainfall event as established by the National Climatic Center, National Oceanic and Atmospheric Administration for the area in which such impoundment is located may discharge that volume of process waste water which is equivalent to the volume of precipitation that falls within the impoundment in excess of that attributable to the 25 year, 24 hour rainfall event, when such event occurs.

§ 415.94 [Reserved]

§ 415.95 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties which may be discharged by a new source subject to the provisions of this subpart:

(a) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste water from hydrogen peroxide manufacture by the oxidation of alkyl hydroanthraquinones: there shall be no discharge of process waste water pollutants to navigable waters.

(b) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in

process waste water from hydrogen peroxide manufacture by the electrolytic process:

(1) Subject to the provisions of paragraph (b)(2) of this section there shall be no discharge of process waste water pollutants into navigable waters.

(2) A process waste water impoundment which is designed, constructed, and operated so as to contain the precipitation from the 25 year, 24 hour rainfall event as established by the National Climatic Center, National Oceanic and Atmospheric Administration for the area in which such impoundment is located may discharge that volume of process waste water which is equivalent to the volume of precipitation that falls within the impoundment in excess of that attributable to the 25 year, 24 hour rainfall event, when such event occurs.

§ 415.96 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the hydrogen peroxide production subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the navigable waters), shall be the standard set forth in Part 128 of this chapter, except that, for the purpose of this section, § 128.133 of this chapter shall be amended to read as follows:

> In addition to the prohibitions set forth in 40 CFR 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 415.95; *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

SUBPART J—NITRIC ACID PRODUCTION SUBCATEGORY

§ 415.100 Applicability; description of the nitric acid production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of nitric acid in concentrations up to 68 percent.

§ 415.101 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR 401 shall apply to this subpart.

§ 415.102 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Re-

gional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.103 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.104 [Reserved]

§ 415.105 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties,

controlled by this section, which may be discharged by a new source subject to the provisions of this subpart: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.106 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the nitric acid production subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the navigable waters), shall be the standard set forth in Part 128 of this chapter, except that, for the purpose of this section, § 128.133 of this chapter shall be amended to read as follows:

> In addition to the prohibitions set forth in 40 CFR 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 415.105; *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

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SUBPART O—SODIUM CARBONATE PRODUCTION SUBCATEGORY

§ 415.150 Applicability; description of the sodium carbonate production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of sodium carbonate by the Solvay Process.

§ 415.151 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR 401 shall apply to this subpart.

(b) The term "product" shall mean sodium carbonate.

§ 415.152 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent

than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of product)	
TSS	0.20	0.10
ph	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	0.20	0.10
pH	Within the range 6.0 to 9.0.	

§ 415.153 Effluent limitations guideline representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject

to the provisions of this subpart after application of the best available technology economically achievable:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of product)	
TSS	0.34	0.17
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	0.34	0.17
pH	Within the range 6.0 to 9.0.	

§ 415.154 [Reserved]

§ 415.155 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.156 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the sodium carbonate production subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the

navigable waters), shall be the standard set forth in Part 128 of this chapter, except that, for the purpose of this section, § 128.133 of this chapter shall be amended to read as follows:

> In addition to the prohibitions set forth in 40 CFR 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 415.155: *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

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SUBPART Q—SODIUM DICHROMATE AND SODIUM SULFATE PRODUCTION SUBCATEGORY

§ 415.170 Applicability; description of the sodium dichromate and sodium sulfate production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of sodium dichromate and by-product sodium sulfate.

§ 415.171 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR 401 shall apply to this subpart.

(b) The term "product" shall mean sodium dichromate.

(c) The term "Cr(T)" shall mean total cromium.

(d) The term "Cr(+6)" shall mean hexavalent chromium.

§ 415.172 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The following limitations establish the quantity or quality

of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms for 1,000 kg of product)	
TSS	0.44	0.22
Cr (+6)	.009	.0005
Cr (T)	.0088	.0044
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	0.44	0.22
Cr (+6)	.009	.0005
Cr (T)	.0088	.0044
pH	Within the range 6.0 to 9.0.	

§ 415.173 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

(a) Subject to the provisions of paragraph (b) of this section there shall be no discharge of process waste water pollutants into navigable waters.

(b) A process waste water impoundment which is designed, constructed, and operated so as to contain the precipitation from the 25 year, 24 hour rainfall event as established by the National Climatic Center, National Oceanic and Atmospheric Administration for the area in which such impoundment is located may discharge that volume of process waste water which is equivalent to the volume of precipitation that falls within the impoundment in excess of that attributable to the 25 year, 24 hour rainfall event, when such event occurs.

§ 415.174 [Reserved]

§ 415.175 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart:

Effluent characteristic	Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kg/kkg of product)	
TSS	0.30	0.15
Cr (+6)	0.009	0.0005
Cr (T)	0.0088	0.0044
pH	Within the range 6.0 to 9.0.	
	English units (lb/1000 lb of product)	
TSS	0.30	0.15
Cr (+6)	0.009	0.0005
Cr (T)	0.0088	0.0044
pH	Within the range 6.0 to 9.0.	

§ 415.176 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the sodium dichromate and sodium sulfate production subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the navigable waters), shall be the standard set forth in Part 128 of this chapter except that, for the purpose of this section, § 128.133 of this chapter shall be amended to read as follows:

> In addition to the prohibitions set forth in 40 CFR 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 415.175; *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

SUBPART R—SODIUM METAL PRODUCTION SUBCATEGORY

§ 415.180 Applicability; description of the sodium metal production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of sodium metal by the Downs cell process.

§ 415.181 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR 401 shall apply to this subpart.

(b) The term "product" shall mean sodium metal.

§ 415.182 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or

the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

Effluent characteristic	Effluent limitations: Maximum for any 1 day	Effluent limitations: Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of product)	
TSS	0.46	0.23
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	0.46	0.23
pH	Within the range 6.0 to 9.0.	

§ 415.183 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

(a) Subject to the provisions of paragraph (b) of this section there shall be no discharge of process waste water pollutants into navigable waters.

(b) A process waste water impoundment which is designed, constructed, and operated so as to contain the precipitation from the 25 year, 24 hour rainfall event as established by the National Climatic Center, National Oceanic and Atmospheric Administration for the area in which such impoundment is located may discharge that volume of process waste water which is equivalent to the volume of precipitation that falls within the impoundment in excess of that attributable to the 25 year, 24 hour rainfall event, when such event occurs.

§ 415.184 [Reserved]

§ 415.185 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart:

(a) Subject to the provisions of paragraph (b) of this section there shall be no discharge of process waste water pollutants into navigable waters.

(b) A process waste water impoundment which is designed, constructed, and operated so as to contain the precipitation from the 25 year, 24 hour rainfall event as established by the National Climatic Center, National Oceanic and Atmospheric Administration for the area in which such impoundment is located may discharge that volume of process waste water which is equivalent to the volume of precipitation that falls within the impoundment in excess of that attributable to the 25 year, 24 hour rainfall event, when such event occurs.

§ 415.186 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the sodium metal production subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the navigable waters), shall be the standard set forth in Part 128 of this chapter, except that, for the purpose of this section, § 128.133 of this chapter shall be amended to read as follows:

> In addition to the prohibitions set forth in 40 CFR 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 415.185; *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

SUBPART S—SODIUM SILICATE PRODUCTION SUBCATEGORY

§ 415.190 Applicability; description of the sodium silicate production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of sodium silicate.

§ 415.191 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR 401 shall apply to this subpart.

(b) The term "product" shall mean sodium silicate.

§ 415.192 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines.

On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

Effluent characteristic	Effluent limitations: Maximum for any 1 day	Effluent limitations: Average of daily values for 30 consecutive days shall not exceed
	Metric units (kilograms per 1,000 kg of product)	
TSS	0.01	0.005
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	0.01	0.005
pH	Within the range 6.0 to 9.0.	

§ 415.193 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

(a) Subject to the provisions of paragraph (b) of this section there shall be no discharge of process waste water pollutants into navigable waters.

(b) A process waste water impoundment which is designed, constructed, and operated so as to contain the precipitation from the 25 years, 24 hour rainfall event as established by the National Climatic Center, National Oceanic and Atmospheric Administration for the area in which such impoundment is located may discharge that volume of process waste water which is equivalent to the volume of precipitation that falls within the impoundment in excess of that attributable to the 25 year, 24 hour rainfall event, when such event occurs.

§ 415.194 [Reserved]

§ 415.195 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart:

(a) Subject to the provisions of paragraph (b) of this section there shall be no discharge of process waste water pollutants into navigable waters.

(b) A process waste water impoundment which is designed, constructed, and operated so as to contain the precipitation from the 25 year, 24 hour rainfall event as established by the National Climatic Center, National

Oceanic and Atmospheric Administration for the area in which such impoundment is located may discharge that volume of process waste water which is equivalent to the volume of precipitation that falls within the impoundment in excess of that attributable to the 25 year, 24 hour rainfall event, when such event occurs.

§ 415.196 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the sodium silicate production subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the navigable waters), shall be the standard set forth in Part 128 of this Chapter, except that, for the purpose of this section, § 128.133 of this chapter shall be amended to read as follows:

> In addition to the prohibitions set forth in 40 CFR 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 415.195; *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

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SUBPART U—SULFURIC ACID PRODUCTION SUBCATEGORY

§ 415.210 Applicability; description of the sulfuric acid production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of sulfuric acid in single and double adsorption plants. The provisions are

not applicable to discharges from plants recovering waste sulfuric acid.

§ 415.211 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR 401 shall apply to this subpart.

§ 415.212 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional

Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.213 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.214 [Reserved]

§ 415.215 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this section, which may be discharged by a new source subject to the provisions of this subpart: there shall be no discharge of process waste water pollutants to navigable waters.

§ 415.216 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the sulfuric acid production subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the navigable waters), shall be the standard set forth in Part 128 of this Chapter, except that, for the purpose of this section, § 128.133 of this Chapter shall be amended to read as follows:

> In addition to the prohibitions set forth in 40 CFR 128.131, the pretreatment standard for incompatible pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 415.215; *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

SUBPART V—TITANIUM DIOXIDE PRODUCTION SUBCATEGORY

§ 415.220 Applicability; description of the titanium dioxide production subcategory.

The provisions of this subpart are applicable to discharges resulting from the production of titanium dioxide by the sulfate process and by the chloride process.

§ 415.221 Specialized definitions.

For the purpose of this subpart:

(a) Except as provided below, the general definitions, abbreviations and methods of analysis set forth in 40 CFR 401 shall apply to this subpart.

(b) The term "product" shall mean titanium dioxide.

(c) The term "iron" shall mean total iron.

§ 415.222 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established. It is, however, possible that data which would affect these limitations have not been available and, as a result, these limitations should be adjusted for certain plants in this industry. An individual discharger or other interested person may submit evidence to the Regional Administrator (or to the State, if the State has the authority to issue NPDES permits) that factors relating to the equipment or facilities involved, the process applied, or other such factors related to such discharges are fundamentally different from the factors considered in the establishment of the guidelines. On the basis of such evidence or other available information, the Regional Administrator (or the State) will make a written finding that such factors are or are not fundamentally different for that facility compared to those specified in the Development Document. If such fundamentally different factors are found to exist, the Regional Administrator or the State shall establish for the discharger effluent limitations in the NPDES permit either more or less stringent than the limitations established herein, to the extent

dictated by such fundamentally different factors. Such limitations must be approved by the Administrator of the Environmental Protection Agency. The Administrator may approve or disapprove such limitations, specify other limitations, or initiate proceedings to revise these regulations. The following limitations establish the quantity or quality of pollutants or pollutant properties which may be discharged by a point source subject to the provisions of this subpart after application of the best practicable control technology currently available:

(a) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste water from titanium dioxide manufacture by the chloride process:

Effluent characteristic	Effluent limitations: Maximum for any 1 day	Effluent limitations: Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of product)	
TSS	4.6	2.3
Iron	.72	.36
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	4.6	2.3
Iron	.72	.36
pH	Within the range 6.0 to 9.0.	

(b) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste water from titanium dioxide manufactured by the sulfate process:

Effluent characteristic	Effluent limitations: Maximum for any 1 day	Effluent limitations: Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of product)	
TSS	21.0	10.5
Iron	1.7	.84
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	21.0	10.5
Iron	1.7	.84
pH	Within the range 6.0 to 9.0.	

§ 415.223 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable.

The following limitations establish the quantity or quality of pollutants or pollutant properties which may be discharged by a point source subject to the provisions of this subpart after application of the best available technology economically achievable:

(a) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste water from titanium dioxide production by the chloride process:

Effluent characteristic	Effluent limitations: Maximum for any 1 day	Effluent limitations: Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of product)	
TSS	2.6	1.3
Iron	.36	.18
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	2.6	1.3
Iron	.36	.18
pH	Within the range 6.0 to 9.0.	

(b) The following limitations establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste

water from titanium dioxide manufacture by the sulfate process:

Effluent characteristic	Effluent limitations: Maximum for any 1 day	Effluent limitations: Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of product)	
TSS	10.6	5.3
Iron	.84	.42
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	10.6	5.3
Iron	.84	.42
pH	Within the range 6.0 to 9.0.	

§ 415.224 [Reserved]

§ 415.225 Standards of performance for new sources.

The following standards of performance establish the quantity or quality of pollutants or pollutant properties which may be discharged by a new source subject to the provisions of this subpart:

(a) The following standards of performance establish the quantity or quality of pollutants or pollutant properties,

controlled by this paragraph, which may be discharged in process waste water from titanium dioxide manufacture by the chloride process:

Effluent characteristic	Effluent limitations: Maximum for any 1 day	Effluent limitations: Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of product)	
TSS	2.6	1.3
Iron	.36	.18
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	2.6	1.3
Iron	.36	.18
pH	Within the range 6.0 to 9.0.	

(b) The following standards of performance establish the quantity or quality of pollutants or pollutant properties, controlled by this paragraph, which may be discharged in process waste water from titanium dioxide manufacture by the sulfate process:

Effluent characteristic	Effluent limitations: Maximum for any 1 day	Effluent limitations: Average of daily values for 30 consecutive days shall not exceed—
	Metric units (kilograms per 1,000 kg of product)	
TSS	10.6	5.3
Iron	.84	.42
pH	Within the range 6.0 to 9.0.	
	English units (pounds per 1,000 lb of product)	
TSS	10.6	5.3
Iron	.84	.42
pH	Within the range 6.0 to 9.0.	

§ 415.226 Pretreatment standards for new sources.

The pretreatment standards under section 307(c) of the Act for a source within the titanium dioxide production subcategory, which is a user of a publicly owned treatment works (and which would be a new source subject to section 306 of the Act, if it were to discharge pollutants to the navigable waters), shall be the standard set forth in Part 128 of this chapter, except that, for the purpose of this section, § 128.133 of this chapter shall be amended to read as follows:

> In addition to the prohibitions set forth in 40 CFR 128.131, the pretreatment standard for incompatible

> pollutants introduced into a publicly owned treatment works shall be the standard of performance for new sources specified in 40 CFR 415.225; *Provided*, That, if the publicly owned treatment works which receives the pollutants is committed, in its NPDES permit, to remove a specified percentage of any incompatible pollutant, the pretreatment standard applicable to users of such treatment works shall, except in the case of standards providing for no discharge of pollutants, be correspondingly reduced in stringency for that pollutant.

[FR Doc. 74–5591 Filed 3–11–74; 8:45 am]

APPENDIX C

"EFFLUENT GUIDELINES AND STANDARDS: GENERAL PROVISIONS."

The rulemaking order promulgating the foregoing regulations is found at 39 *Fed. Reg.* 4531-33 (February 4, 1974). The preamble of the order and the text of the regulations are as follows:

Title 40—Protection of the Environment

CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

Subchapter N—Effluent Guidelines and Standards

PART 401—GENERAL PROVISIONS

Notice was published in the FEDERAL REGISTER, August 22, 1973, (38 FR 22606) of the proposal of 40 CFR Part 401 setting forth certain provisions applicable to all further regulations for particular categories of point sources to be issued under 40 CFR Parts 402 through 699. These regulations will provide effluent limitations guidelines for existing sources, standards of performance for new sources and pretreatment standards for new and existing sources pursuant to sections 301, 304 (b) and (c), 306 (b) and (c), 307 (b) and (c) and 316 (b) of the Federal Water Pollution Control Act, as amended, (the "Act") 33 U.S.C. 1251, 1311, 1314 (b) and (c), 1316 (b) and (c), 1317 (b) and (c) and 1326 (c); 86 Stat. 816 et seq.; Pub. L. 92-500. Part 401 is intended to provide a description of the applicable legal authorities and definitions which will apply throughout the series of individual regulations.

The regulation as set forth below contains minor departures from the proposed regulation published at 38 FR 22606. No comments were received from the public concerning this regulation. Additions and changes were made in order to clarify for the public such terms, definitions, abbreviations, and parameters commonly used by the Environmental Protection Agency in the issuance of and

appertaining to the regulations set forth at 40 CFR Parts 402 through 699.

The principal revisions to this proposed regulation are as follows:

(1) Section 401.11 *General definitions* has been expanded beyond the proposed version to include certain abbreviations which are used throughout Parts 402 through 699, and to define certain additional specialized terms frequently used in Parts 402 through 699 including "process waste water," "process waste water pollutants," "noncontact cooling water," "noncontact cooling water pollutants," and "blowdown." The inclusion of these terms and abbreviations in the list of generally applicable definitions is intended to make the public more certain of their meaning when used throughout subsequent regulations issued at 40 CFR Parts 402 through 699.

(2) Additionally, the proposed 40 CFR Part 130 (38 FR 17318) has been superseded by 40 CFR Part 136 (38 FR 28758) "Guidelines Establishing Test Procedures For The Analysis of Pollutants" published in the FEDERAL REGISTER, dated October 16, 1973. Minor corrections have been made in the regulation below to reflect that change of reference.

(3) Section 401.12 has been expanded to include a description of authority under sections 304(c), 307(b) and 316(b) of the Act.

Further revision of this regulation may be made in the future to update the list of terms, definitions, abbreviations and parameters.

In consideration of the foregoing 40 CFR Ch. I, is hereby amended by adding a new Subchapter N and new Part 401, General Provisions, therein to read as set forth below. This final regulation is promulgated as set forth below and shall be effective April 5, 1974.

Dated: January 22, 1974.

JOHN QUARLES,
Acting Administrator.

AUTHORITY: Secs. 301, 304 (b) and (c), 306 (b) and (c), 307 (b) and (c) and 316 (b) of the Federal Water Pollution Control Act, as amended (the "Act"), 33 U.S.C. 1251, 1311, 1314 (b) and (c), 1316 (b) and (c), 1317 (b) and (c) and 1326 (c); 36 Stat. 816 et seq.; Pub. L. 92–500.

§ 401.10 Scope and purpose.

Regulations promulgated or proposed under Parts 402 through 699 of this subchapter prescribe effluent limitations guidelines for existing sources, standards of performance for new sources and pretreatment standards for new and existing sources pursuant to sections 301, 304 (b) and (c), 306 (b) and (c), 307 (b) and (c) and 316 (b) of the Federal Water Pollution Control Act, as amended (the "Act"), 33 U.S.C. 1251, 1311, 1314 (b) and (c), 1316 (b) and (c), 1317 (b) and (c) and 1326 (b); 86 Stat. 816; Pub. L. 92–500. Point sources of discharges of pollutants are required to comply with these regulations, where applicable, and permits issued by States or the Environmental Protection Agency (EPA) under the National Pollutant Discharge Elimination System (NPDES) established pursuant to section 402 of the Act must be conditioned upon compliance with applicable requirements of sections 301 and 306 (as well as certain other requirements). This Part 401 sets forth the legal authority and general definitions which will apply to all regulations issued concerning specific classes and categories of point sources under Parts 402 through 699 of this subchapter which follow. In certain instances the regulations applicable to a particular point

source category or subcategory will contain more specialized definitions. In the case of any conflict between regulations issued under this Part 401 and regulations issued under Parts 402 through 699 of this subchapter, the latter more specific regulations shall apply.

§ 401.11 General definitions.

For the purpose of Parts 402 through 699 of this subchapter:

(a) The term "Act" means the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq., 86 Stat. 816, Pub. L. 92–500.

(b) The term "Administrator" means the Administrator of the United States Environmental Protection Agency.

(c) The term "Environmental Protection Agency" means the United States Environmental Protection Agency.

(d) The term "point source" means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.

(e) The term "new source" means any building, structure, facility or installation from which there is or may be the discharge of pollutants, the construction of which is commenced after the publication of proposed regulations prescribing a standard of performance under section 306 of the Act which will be applicable to such source if such standard is thereafter promulgated in accordance with section 306 of the Act.

(f) The term "pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal and agricultural waste discharged into water. It does not mean (1) sewage

from vessels or (2) water, gas or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil or gas production and disposed of in a well, if the well, used either to facilitate production or for disposal purposes, is approved by authority of the State in which the well is located, and if such State determines that such injection or disposal will not result in degradation of ground or surface water resources.

(g) The term "pollution" means the man-made or man induced alteration of the chemical, physical, biological and radiological integrity of water.

(h) The term "discharge of pollutant(s)" means (1) the addition of any pollutant to navigable waters from any point source and (2) any addition of any pollutant to the waters of the contiguous zone or the ocean from any point source, other than from a vessel or other floating craft. The term "discharge" includes either the discharge of a single pollutant or the discharge of multiple pollutants.

(i) The term "effluent limitation" means any restriction established by the Administrator on quantities, rates, and concentrations of chemicals, physical, biological and other constituents which are discharged from point sources, other than new sources, into navigable waters, the waters of the contiguous zone or the ocean.

(j) The term "effluent limitations guidelines" means any effluent limitations guidelines issued by the Administrator pursuant to section 304(b) of the Act.

(k) The term "standard of performance" means any restriction established by the Administrator pursuant to section 306 of the Act on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are or may be discharged from new sources into navigable waters, the waters of the contiguous zone or the ocean.

(1) The term "navigable waters" includes: All navigable waters of the United States; tributaries of navigable waters

of the United States; interstate waters; intrastate lakes, rivers, and streams which are utilized by interstate travelers for recreational or other purposes; intrastate lakes, rivers, and streams from which fish or shellfish are taken and sold in interstate commerce; and intrastate lakes, rivers, and streams which are utilized for industrial purposes by industries in interstate commerce.

(m) The terms "state water pollution control agency," "interstate agency," "State," "municipality," "person," "territorial seas," "contiguous zone," "biological monitoring," "schedule of compliance," and "industrial user" shall be defined in accordance with section 502 of the Act unless the context otherwise requires.

(n) The term "noncontract cooling water" means water used for cooling which does not come into direct contact with any raw material, intermediate product, waste product or finished product.

(o) The term "noncontact cooling water pollutants" means pollutants present in noncontact cooling waters.

(p) The term "blowdown" means the minimum discharge of recirculating water for the purpose of discharging materials contained in the water, the further buildup of which would cause concentration in amounts exceeding limits established by best engineering practice.

(q) The term "process waste water" means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, by-product, or waste product.

(r) The term "process waste water pollutants" means pollutants present in process waste water.

(s) The following abbreviations shall have the following meanings: (1) "BOD5" means five-day biochemical oxygen demand; (2) "COD" means chemical oxygen demand; (3) "TOC" means total organic carbon; (4) "TDS" means

total dissolved solids; (5) "TSS" means total suspended non-filterable solids; (6) "kw" means kilowatt(s); (7) "kwh" means kilowatt hour(s); (8) "Mw" means megawatt(s); (9) "Mwh" means megawatt hour(s); (10) "hp" means horsepower; (11) "mm" means millimeter(s); (12) "cm" means centimeter; (13) "m" means meter(s); (14) "in." means inch; (15) "ft" means foot (feet); (16) "l" means liter(s); (17) "cu m" means cubic meter(s); (18) "k cu m" means 1000 cubic meter(s); (19) "gal" means gallon(s); (20) "cu ft" means cubic foot (feet); (21) "mg" means milligram(s); (22) "g" means gram(s); (23) "kg" means kilogram(s); (24) "kkg" means 1000 kilogram(s); (25) "lb" means pound(s); (26) "sq m" means square meter(s); (27) "ha" means hectare(s); (28) "sq ft" means square foot (feet); and (29) "ac" means acre(s).

§ 401.12 Law authorizing establishment of effluent limitations guidelines for existing sources, standards of performance for new sources and pretreatment standards of new and existing sources.

(a) Section 301(a) of the Act provides that "except as in compliance with this section and sections 302, 306, 307, 318, 402 and 404 of this Act, the discharge of any pollutant by any person shall be unlawful."

(b) Section 301(b) of the Act requires the achievement by not later than July 1, 1977, of effluent limitations for point sources, other than publicly owned treatment works, which require the application of the best practicable control technology currently available as determined by the Administrator pursuant to section 304(b)(1) of the Act. Section 301(b) also requires the achievement by not later than July 1, 1983, of effluent limitations for point sources, other than publicly owned treatment works, which require the application of the best available technology economically achievable which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations

issued by the Administrator pursuant to section 304(b)(2) of the Act.

(c) Section 304(b) of the Act requires the Administrator to publish regulations providing guidelines for effluent limitations setting forth the degree of effluent reduction attainable through the application of the best practicable control technology currently available and the degree of effluent reduction attainable through the application of the best control measures and practices achievable including treatment techniques, process and procedure innovations, operating methods and other alternatives.

(d) Section 304(c) of the Act requires the Administrator, after consultation with appropriate Federal and State agencies and other interested persons to issue information on the process, procedures, or operating methods which result in the elimination or reduction of the discharge of pollutants to implement standards of performance under section 306 of the Act.

(e) Section 306(b)(1)(B) of the Act requires the Administrator, after a category of sources is included in a list published pursuant to section 306(b)(1)(A) of the Act, to propose regulations establishing Federal standards of performances for new sources within such category. Standards of performance are to provide for the control of the discharge of pollutants which reflect the greatest degree of effluent reduction which the Administrator determines to be achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants.

(f) Section 307(b) provides that the Administrator shall establish pretreatment standards which shall prevent the discharge of any pollutant into publicly owned treatment works which pollutant interferes with, passes through untreated, or otherwise is incompatible with such works.

(g) Section 307(c) of the Act provides that the Administrator shall promulgate pretreatment standards for sources

which would be "new sources" under section 306 (if they were to discharge pollutants directly to navigable waters) at the same time standards of performance for the equivalent category of new sources are promulgated.

(h) Section 316(b) of the Act provides that any standard established pursuant to section 301 or section 306 of the Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

(i) Section 402(a)(1) of the Act provides that the Administrator may issue permits for the discharge of any pollutant upon condition that such discharge will meet all applicable requirements under sections 301, 302, 306, 307, 308 and 403 of this Act. In addition, section 402(b)(1)(A) of the Act requires that permits issued by States under the National Pollutant Discharge Elimination System (NPDES) established by the Act must apply, and insure compliance with any applicable requirements of sections 301, 302, 306, 307 and 403 of the Act.

§ 401.13 Test procedures for measurement.

The test procedures for measurement which are prescribed at Part 136 of this chapter shall apply to expressions of pollutant amounts, characteristics or properties in effluent limitations guidelines and standards of performance and pretreatment standards as set forth at Parts 402 through 699 of this subchapter, unless otherwise specifically noted or defined in said parts.

[FD Doc.74-2348 Filed 2-1-74;8:45 am]

APPENDIX D

EPA actions not subject to direct review in the courts of appeals under Section 509 include:

(1) *Regulations Governing the Issuance of Permits—*

(a) *Ocean Discharge Criteria (Section 403).* The Act requires EPA to "promulgate guidelines for determining the degradation of the waters of the territorial seas, the contiguous zone, and the oceans." Section 403(c)(1), 33 U.S.C. § 1343(c)(1). The substantive requirement of salt water protection which these standards implement is parallel and of importance equal to the technological requirements of Section 301(b). Permits under Section 402 for dumping into the waters covered by the guidelines may not be issued "except in compliance with such guidelines." Section 403(a), 33 U.S.C. § 1343(a).

(b) *Guidelines for Disposal of Dredged or Fill Material (Section 404).* Authority to issue permits for disposal of dredged or fill material into navigable water resides with the Corps of Engineers. The designation of disposal sites in such permits must be from "application of guidelines" established by EPA "in conjunction with" the Corps. Section 404 guidelines for permits are not reviewable under Section 509.

(c) *Regulations on Disposal of Sewage Sludge (Section 405).* An EPA permit must be obtained for the disposal in navigable waters from public treatment systems. Section 405(a), 33 U.S.C. § 1345(a). Such permits are to be based on EPA "regulations governing the disposal of sewage sludge." Section 405(b), 33 U.S.C. § 1345(b).

(2) *Major Regulatory Actions.* Further demonstration of the limited scope of Section 509 lies in the fact that it does not cover a large number of important EPA regulatory actions—

(a) *Area-Wide Waste Management Plans (Section 208).* In addition to the guidelines noted above for the control

of nonpoint sources of pollution in area-wide waste management, the 1972 Act gives EPA authority to issue guidelines and requires approval of various elements of this basic program. Section 208 (a)(1) and (7), (b)(1) and (3), and (c)(2), 33 U.S.C. § 1288 (a)(1) and (7), (b)(1) and (3), and (c)(2).

(b) *Water Quality Standards (Section 303).* State-adopted water quality standards are subject to approval by EPA and, if not approved, such standards must be promulgated by EPA. Similarly, State plans for allocating allowable waste loads among discharges must be presented to EPA with EPA required to promulgate a substitute if it determines that the State allocation does not meet the requirements of the Act. Section 303, 33 U.S.C. § 1313. The water quality standards and the allocation implement the requirements of Section 301(b)(1)(C) and 302 for water-quality based effluent limitations.

(c) *Spills of Oil and Hazardous Materials (Section 311).* Section 311 authorizes substantial fines and penalties for spills of oil and hazardous materials. Section 311(b)(2)(B) and (b)(5) and (6), as amended, 33 U.S.C. § 1321(b)(2)(B) and (b)(5) and (6). EPA is required to develop regulations governing the discharges (spills) for which liability may occur and the magnitude of the liability and requirements applicable to individual plants for prevention of such incidents. Section 311(b)(2), (3), and (4) and (j), 33 U.S.C. § 1321(b)(1), (2), and (3) and (j).

(3) *Other EPA actions under Section 304.* Section 304 is entitled "Information and *Guidelines*." Not one of the promulgations by EPA is covered by Section 509. Among them are—

(a) *Section 305(a).* EPA must establish the water quality criteria on which State water quality standards under Section 303 are based. State water quality standards are the alternative to technology for *effluent limitations* under Section 301(b)(1)(C) and 302.

(b) *Section 304(c).* EPA must publish information on the means of reducing effluent discharges for the purpose of meeting the new source standards of performance under Section 306. Standards for new plants are covered under Section 509(b), but technological benchmarks for new source standards are not. Section 304(c) serves a function somewhat similar to the identification in Section 304(b) of effluent reductions and the factors to be assessed in determining effluent limitations based on best practicable and best available technology.

(c) *Section 304(d).* EPA must publish information on "effluent reductions attainable" through the application of secondary treatment by public sewer systems. Secondary treatment is the technological basis for public sewer system "*effluent limitations*" under Section 301(b)(1)(B). EPA also must publish information on alternative waste management techniques meeting the criteria of best practicable waste treatment technology. Best practicable technology is the basis for the Section 301(b)(2) standard for public sewers. Section 304(d) is not mentioned in Section 509.

(d) *Section 304(e).* EPA must publish "(1) *guidelines* for identifying the nature and extent of nonpoint sources of pollutants and (2) processes, procedures, and methods to control pollution from" agricultural, construction, subsurface-disposal, and other "nonpoint" sources. Such guidelines are not academic studies for use by the States in their discretion. Control of non-point sources is a mandatory part of State plans for area-wide management. Section 208(b)(2)(F) to (I) and (K), 33 U.S.C. § 1288(b)(2)(F) to (I) and (K). Area-wide waste management programs were considered to be among the most important of the 1972 Act. (See H.R. Rep. No. 92-911, 92d Cong., 2d Sess., at 72, 95 (1972).) No discharge permit may be issued contrary to an area-wide plan. (Section 208(e), 33 U.S.C. § 1288(e).) Grants for public sewer systems may not be issued except as consistent with an area-wide plan. (Section 208(d).) No less than the technological effluent limitations under Section 301(b), area-wide waste

management plans are a key to the congressional program for clean water and to discharge permits for public sewer systems and industrial sources.

(e) *Section 304(f).* EPA is required to promulgate pretreatment standards for existing sources. (Section 307(b).) It also must promulgate pretreatment standards for new sources. (Section 307(c).) Both, through the 1973 amendments to the Act, are covered by Section 509(b). But EPA has other obligations with respect to the quality of industrial effluent prior to its introduction into a public sewer system. Under Section 304(f), EPA must publish "*guidelines for pretreatment* of pollutants which it determines are not susceptible to treatment by publicly owned treatment works." Significantly, these guidelines are for the purpose of "assisting the States in carrying out programs under Section 402" by establishing conditions of NPDES permits for public sewer systems consistent with the Act, and the guidelines are to "designate the category or categories of treatment works to which the guidelines apply." There is no suggestion that the provisions of Section 509 apply to the pretreatment guidelines of Section 304(f).

(f) *Section 304(g).* EPA is required to "promulgate *guidelines* establishing test procedures for analysis of pollutants." These guidelines are applied in connection with permit applications, are applied as a part of reporting requirements in conditions of issued permits, and are used in enforcement actions.

(g) *Section 304(h).* EPA must "promulgate *guidelines* for the purpose of establishing uniform application forms and other minimum requirements for the acquisition of information from owners and operators of point-sources" and "promulgate guidelines establishing minimum procedural and other elements of any State program under Section 402." EPA's approval or disapproval of a particular State program is covered by Section 509; the guidelines for State programs are not.

(4) *Other Regulations.* Not all EPA guidelines and regulations provide bases for permits, but many in addi-

tion to those in Section 304 have an important regulatory impact.

(a) *User Charge Guidelines (Section 204(b)(2)).* Assessment of user charges from industrial sewers is a requirement for construction grants and NPDES for public sewer systems. Sections 204(b)(1), 33 U.S.C. § 1284(b)(1); Section 402(b)(9), 33 U.S.C. § 1342(b)(9) "Guidelines" issued by EPA govern such charges. Section 204(b)(2), 33 U.S.C. § 1284(b)(2).

(b) *Guidelines and Regulations for Issuance of Construction Grants (Sections 201(g)(4), 205(a), and 212(2)(c)).* Upgrading of public sewage treatment by infusion of Federal funds is a critical aspect of the 1972 Act. Many important standards and conditions for Federal grants and construction are to be established by EPA regulations and guidelines. Sections 201(g)(4), 33 U.S.C. § 1281(g)(4); 205(a), 33 U.S.C. § 1285(a); 212(2)(C), 33 U.S.C. § 1292(2)(C). Neither these regulations and guidelines nor EPA issuance (or refusal to issue) construction grants are within the scope of Section 509.

(c) *Aquaculture Guidelines (Section 318).* EPA is authorized to permit the discharge of pollutants from aquaculture projects. Section 318(a), 33 U.S.C. § 1328(a). To implement that authority, EPA must "by regulation * * * establish any procedures and guidelines [the Administrator] deems necessary." Section 318(a), 33 U.S.C. § 1328(a).

No. 75-978

In the Supreme Court of the United States

OCTOBER TERM, 1976

E. I. DUPONT DE NEMOURS AND COMPANY, ET AL.,
PETITIONERS

v.

RUSSELL E. TRAIN, AS ADMINISTRATOR, ENVIRONMENTAL
PROTECTION AGENCY, ET AL.

*ON WRIT OF CERTIORARI TO THE UNITED STATES
COURT OF APPEALS FOR THE FOURTH CIRCUIT*

BRIEF FOR THE RESPONDENTS

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BRIEF FOR THE RESPONDENTS

OPINIONS BELOW

The opinion of the court of appeals (A. 240-251)[1] is reported at 528 F. 2d 1136. The opinion and order of the district court (A. 219-239) are reported at 383 F. Supp. 1244.

JURISDICTION

The judgment of the court of appeals (A. 252) was entered on December 30, 1975. The petition for

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[1] "A." refers to the Appendix. "App. Br." refers to the separate Appendices to Petitioners' Brief. "A. Exh. Vol." refers to the Exhibit Volume of the Appendix.

a writ of certiorari was filed on January 12, 1976, and was granted on April 19, 1976 (A. 290). The jurisdiction of this Court rests on 28 U.S.C. 1254(1).

QUESTIONS PRESENTED [2]

1. Whether the Administrator of the Environmental Protection Agency may promulgate effluent limitations for existing industrial sources of water pollution, uniform within industrial classes, categories and subcategories, as national minimum requirements under Section 301 of the Federal Water Pollution Control Act Amendments of 1972.

2. Whether the courts of appeals have exclusive jurisdiction to review effluent limitations promulgated by the Administrator under Section 301 of the Amendments, which includes jurisdiction to review the guidelines he promulgated under Section 304 in the same proceeding as the effluent limitations.

[2] The court of appeals decided this case in two steps. The first decision ("*duPont I*") held only that the court of appeals rather than the district court had jurisdiction to review the actions of the Administrator of the Environmental Protection Agency here challenged. The second decision ("*duPont II*") decided the merits of petitioners' challenges to those actions (A. 253-286). The present petition involves only *duPont I*. It raises both the jurisdictional issue and the merits. The chemical company's petition in *duPont II* (No. 74-1473) raises the same questions. The government filed a cross-petition in *duPont II* (No. 75-1705), raising an additional question.

The Court granted the petition and the cross-petition in *duPont II* on June 21, 1976 (A. 291, 292). It consolidated the petition and cross-petition in *duPont II*, provided that *duPont II* be argued *in tandem* with *duPont I* (A. 291-292), but did not consolidate *duPont I* and *duPont II*.

The parties have agreed that their opening briefs in the present case will discuss both the jurisdictional and substantive questions which the petition in No. 75-978 and the chemical companies' petition in *duPont II* (No. 74-1473) raise. The government is filing a separate brief on the issue raised by its petition in *duPont II* (No. 75-1705).

STATUTES AND REGULATIONS INVOLVED

Pertinent provisions of the Federal Water Pollution Control Act Amendments of 1972, 86 Stat. 816 *et seq.*, 33 U.S.C. (Supp. V) 1251 *et seq.*, and regulations promulgated thereunder, are reproduced in the separate appendices to petitioners' brief (App. Br. 1a-42a, 1b-79b, 1c-9c).

STATEMENT

This case involves Titles III, IV and V of the Federal Water Pollution Control Act Amendments of 1972, 86 Stat. 816, 844-896, 33 U.S.C. (Supp. V) 1251, 1311-1376 ("the Amendments"). These provisions establish methods and procedures for achieving the Amendments' declared objective: "to restore and maintain the chemical, physical and biological integrity of the Nation's waters." Section 101(a), 33 U.S.C. (Supp. V) 1251(a). More particularly, the case concerns the relationship between "effluent limitations" promulgated under Section 301(b) of the Amendments, 33 U.S.C. (Supp. V) 1311(b), and "regulations providing guidelines for effluent limitations" under Section 304(b), 33 U.S.C. (Supp. V) 1314(b). We explain these terms more fully below.

A. THE BACKGROUND OF THE AMENDMENTS

The Amendments' origin and history were reviewed last Term in *Environmental Protection Agency* v.

California ex rel. State Water Resources Control Board, No. 74-1435, decided June 7, 1976 (hereinafter, *State Water Board*). The 1972 Amendments were "prompted by the conclusion of the Senate Committee on Public Works [3] that 'the Federal water pollution control program . . . has been inadequate in every vital aspect'" (*State Water Board, supra,* slip op. 3).

That program had relied upon (*id.* at 2-3)——

> ambient water quality standards specifying the acceptable levels of pollution in a State's interstate navigable waters * * *. * * * The problems stemmed from the character of the standards themselves * * * rather than the preventable causes of water pollution, from the awkwardly shared federal and state responsibility for promulgating such standards, and from the cumbrous enforcement procedures * * *
>
> [T]o strengthen the abatement system federal officials revived the Refuse Act of 1899, 30 Stat. 1152, 33 U.S.C. § 407, which prohibits the discharge of any matter into the Nation's navigable waters except with a federal permit. Although this direct approach to water pollution abatement proved helpful, it also was deficient in several respects: the goal of the discharge permit conditions was to achieve water quality standards rather than to require individual polluters to minimize effluent discharge, the permit program was applied only to industrial polluters, some dischargers were required to obtain both federal and state permits, and federal permit authority was shared by two federal agencies.[4]

[3] See S. Rep. No. 92-414, 92d Cong., 1st Sess. 5 (1971), in 2 Legislative History of the Water Pollution Control Act Amendments of 1972, Committee Print, Senate Committee on Public Works, 93d Cong., 1st Sess. 1423 (1973) (hereinafter "Leg. Hist.").

To remedy these deficiencies, Congress turned from primary reliance upon water quality standards, although these remain important,[5] to effluent limitations reflecting the least discharge of pollutants technologically practicable. They are to be imposed directly on the sources discharging pollutants. *Id.* at 3-4. Water quality standards define quality in terms of the body of water's designated use, and specify a maximum degree of tolerable pollution.[6] An effluent limitation sets the maximum amount of particular pollutants that a given source may discharge into a body of water.

Thus pollution control based primarily on water quality standards accepts discharge of wastes into a body of water, up to a level deemed to interfere with specified uses of the water, such as drinking, fishing, or swimming. Technology-based effluent limitations, in contrast, are grounded on the "view that all pollution is undesirable and should be reduced to the maximum extent that technology will permit."[7]

[4] The two agencies were the Corps of Engineers, which also was empowered to issue permits, and the Environmental Protection Agency, which was to advise the Corps with respect to water quality. Executive Order No. 11574, 35 Fed. Reg. 19627.

[5] As the Court has noted, water quality standards supplement effluent limitations so that more stringent standards may be imposed to preserve the level of local water quality. *State Water Board, supra,* slip op. 4, n. 12.

[6] Zener, *The Federal Law of Water Pollution Control,* in *Federal Environmental Law,* pp. 682, 693-694 (1974).

[7] Zener, *supra,* at p. 694.

B. THE STATUTORY SCHEME

1. THE GENERAL PROHIBITION AGAINST NON-COMPLYING DISCHARGES

Congress declared "the national goal that the discharge of pollutants * * * be eliminated by 1985," Section 101(a)(1), 33 U.S.C. (Supp. V) 1251(a)(1). To achieve this, in Section 301(a), 33 U.S.C. (Supp V) 1311(a), it prohibited any discharge except in accordance with effluent limitations and other restrictions. This section makes unlawful the discharge of any pollutant by any person except in compliance with the sections of the Amendments providing for effluent limitations, reports, inspection and monitoring, and mandatory permits.[8]

The Amendments define "effluent limitation" as any restriction established by a state or the Administrator on quantities, rates or concentrations of chemical, physical, biological or other constituents that are discharged from point sources, including schedules of compliance. Section 502(11), 33 U.S.C. (Supp. V) 1362(11). These restrictions are to be applied to discharges from existing point sources[9] (governed by Section 301(b)); from new point sources (governed by Section 306, 33 U.S.C. (Supp. V) 1316); and from sources of toxic pollutants (governed by Section 307(a), 33 U.S.C. (Supp. V) 1317(a)). Restrictions that

[8] Section 301(a) provides: "Except as in compliance with this section and sections 302, 306, 307, 318, 402 and 404 of this Act, the discharge of any pollutant by any person shall be unlawful."

[9] A point source is a discrete outlet from which pollutants may be discharged. See Section 502(14), 33 U.S.C. (Supp. V) 1362(14).

are more stringent than the generally applicable limitations, based on state and federal water quality standards under Section 303, 33 U.S.C. (Supp. V) 1313, also are "effluent limitations" with which Section 301(a) requires compliance.

Under this major change in the methods of controlling water pollution, "a discharger's performance is now measured against strict technology-based effluent limitations—specified levels of treatment—to which it must conform, rather than against limitations derived from water quality standards to which it and other polluters must collectively conform." *State Water Board, supra,* slip op. 4.

2. THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

The mandatory permits required by Section 301(a) are issued under the National Pollutant Discharge Elimination System ("NPDES") established by Section 402, 33 U.S.C. (Supp. V) 1342. This system is intended to operate under effluent limitations of general application. (*State Water Board, supra,* slip op. 5):

> An NPDES permit serves to transform generally applicable effluent limitations and other standards—including those based on water quality—into the obligations (including a timetable for compliance) of the individual discharger, and the Amendments provide for direct administrative and judicial enforcement of permits. §§ 309 and 505, 33 U.S.C. §§ 1319, 1365 (Supp. IV). With few exceptions, for enforcement purposes a discharger in compliance with the terms and conditions of an NPDES

permit is deemed to be in compliance with those sections of the Amendments on which the permit conditions are based. § 402(k), 33 U.S.C. § 1342(k) (Supp. IV). In short, the permit defines, and facilitates compliance with and enforcement of, a preponderance of a discharger's obligations under the Amendments.

NPDES permits may be issued by the Administrator (Section 402(a), 33 U.S.C. (Supp. V) 1342(a)), or by a state which operates a permit program approved by the Administrator under specified statutory criteria (Section 402(b), 33 U.S.C. (Supp. V) 1342(b)) and guidelines issued by the Administrator under Section 304(h)(2). Both federal and state permits must "apply and insure compliance with" the sections of the Amendments providing for effluent limitations and standards, and must be for fixed terms not to exceed five years. Sections 402(a)(1), (b)(1) (A) and (B), 33 U.S.C. (Supp. V) 1342(a)(1), (b) (1)(A) and (B).[10]

[10] In *State Water Board*, *supra*, the Court also noted (slip. op. 8): "The EPA retains authority to review operation of a State's permit program. Unless the EPA waives review for particular classes of point sources or for a particular permit application, § 402(d)(3), (e), 33 U.S.C. § 1342(d)(3), (e) (Supp. IV), a State is to forward a copy of each permit application to EPA for review, and no permit may issue if EPA objects that issuance of the permit would be 'outside the guidelines and requirements' of the Amendments. § 402(d)(1), (2), 33 U.S.C. § 1342(d)(1), (2) (Supp. IV). In addition to this review authority, after notice and opportunity to take action, EPA may withdraw approval of a state permit program which is not being administered in compliance with § 402. § 402(c)(3), 33 U.S.C. § 1342(c)(3) (Supp. IV)."

3. EFFLUENT LIMITATIONS AND GUIDELINES FOR EFFLUENT LIMITATIONS

The technological basis for effluent limitations to be applied to existing point sources under Section 301 is to be defined under Section 304(b), 33 U.S.C. (Supp. V) 1314(b). This section directs the Administrator of the Environmental Protection Agency "for the purpose of adopting or revising effluent limitations," to publish "regulations providing guidelines for effluent limitations," to be annually revised, if appropriate. These regulations are to identify, in terms of amounts and constituents and chemical, physical and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of the best control technology available for classes and categories of point sources, and to specify factors to be taken into account in determining the control measures and practices to be applicable to point sources within such categories or classes. Section 304(b) also enumerates certain economic, technological and nonwater quality environmental factors which must be considered.

The technological considerations defined under Section 304(b) are converted into effluent limitations under Section 301(b). That section directs that effluent limitations for existing point sources "be achieved" according to a timetable providing for standards of increasing stringency. The "[e]ffluent limitations established [under section 301] * * * shall be applied to all point sources of discharge of pollutants * * *." Section 301(e), 33 U.S.C. (Supp. V) 1311(e). Accord-

ing to the statutory time table, these limitations must, not later than July 1, 1977, "require the application of the best practicable control technology currently available as defined * * * pursuant to section 304(b) of this Act" (Section 301(b)(1)(A), 33 U.S.C. (Supp. V) 1311(b)(1)(A)). Not later than July 1, 1983, the limitations must "require application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued * * * pursuant to section 304(b)(2) of this Act * * *" (Section 301(b)(2)(A), 33 U.S.C. (Supp. V) 1311(b)(2)(A)). However, the Administrator is authorized to modify the 1983 effluent limitations for individual dischargers who apply for permits after July 1977. Section 301(c), 33 U.S.C. (Supp. V) 1311(c).

The operation of this procedure is illustrated by the development of the effluent limitations challenged in this case. The administrative steps are described in detail *infra,* at pp. 14–21. For present purposes, it is sufficient to state that the Administrator developed technological information concerning effluent control and treatment in the inorganic chemicals manufacturing industry. He divided the industry into subcategories reflecting the components and amounts of pollutants in effluents discharged by plants manufacturing like products with like processes. He examined currently available treatment technologies used in the industry, as well as those used in other industries with similar wastes, to determine the degree to which ap-

plication of the best of these, considered in the light of relevant engineering, economic and other practical factors listed in Section 304(b), will reduce the discharge of the pollutants within each subcategory.

After considering public comments on the initial technical analysis, the Administrator then proposed, again considered public comment upon, and adopted regulations setting forth specific numerical effluent limitations based upon the technological information developed.

A typical example of such an effluent limitation is found in the hydrogen peroxide manufacturing subcategory that uses the oxidation process (App. Br. 46b to 47b). In this subcategory, total suspended solids (TSS) which each point source may discharge per day were 0.8 kilograms ("kg") for each thousand kilograms ("kkg") of hydrogen peroxide produced. Total organic carbon was limited to a daily discharge of 0.44 kg per kkg of product.

Plants in this subcategory that use the electrolytic process discharge no organic carbon, but they do discharge cyanide. The technology for the electrolytic process permitted limits on TSS more stringent than for the oxidation process (0.005 kg per kkg of product per day). Discharge of dissolved cyanide was limited to 0.0004 kg per kkg of product daily. (App. Br. 46b to 77b.) 40 C.F.R. 415.92.[11]

[11] Limitations on the relative concentration of hydrogen ion which indicate acidity or alkalinity ("the pH factor") (A. Exh. Vol. 5934) were expressed as a fixed range reflecting the limits within which acidity or alkalinity may be practicably maintained.

4. ENFORCEMENT AND REVIEW

The Amendments provide for government and private enforcement of effluent limitations. The Administrator may issue an order or bring a civil action to remedy a violation of Section 301, and other sections establishing effluent limitations (*i.e.*, Sections 302, 306, 307), or to remedy a violation of any permit condition or limitation implementing such sections in a permit issued by the Administrator or a State.[12] Violators are subject to injunction and to civil penalties up to $25,000 per day; willful or negligent violation initially is a misdemeanor; repetition is a felony (Section 309(b), (c), (d), 33 U.S.C. (Supp. V) 1319(b), (c), (d)).

Any adversely affected person may institute an action in federal district court against any person "who is alleged to be in violation of * * * an effluent standard or limitation under this Act." Section 505(a), 33 U.S.C. (Supp. V) 1365(a). The term "effluent standard or limitation" is defined for purposes of that section to include an "effluent limitation or other limitation under Section 301 * * *" and other sections authorizing effluent limitations (Sections 302, 306, 307), and a permit or condition thereof issued under Section 402. Section 505(f), 33 U.S.C. (Supp. V) 1365(f).

[12] For enforcement purposes, Section 402(k), 33 U.S.C. (Supp. V) 1342(k), deems a permit holder who is in compliance with the terms of its permit to be in compliance "with sections 301, 302, 306, 307 and 403, except any standard imposed under section 307 for a toxic pollutant injurious to human health." 33 U.S.C. (Supp. V) 1342(k). See *State Water Board*, *supra*, slip op. 22–23.

In the case of a state permit, the Administrator may defer to state enforcement. Section 309(a).

The Administrator's action in approving or promulgating effluent limitations and standards under Section 301 and other sections, as well as in issuing or denying any permit, is subject to judicial review in the courts of appeals upon a petition filed within 90 days of such action. Section 509(b)(1), 33 U.S.C. (Supp. V) 1369(b)(1). Administrative action which is reviewable under this section is not subject to judicial review in civil or criminal enforcement proceedings. Section 509(b)(2), 33 U.S.C. (Supp. V) 1369(b)(2).

Section 304, which provides for regulations defining technological considerations in guidelines for effluent limitations (see pp. 8–11, *supra*) is not listed in Section 301(a) as one of the sections with which a discharger must comply in order lawfully to discharge any pollutant. It is not enumerated among the sections with which a permit must assure compliance under Section 402(a)(1) and (b)(1)(A).[13] Nor is it listed among the sections with which the government may enforce compliance in civil or criminal proceedings under Section 309, 33 U.S.C. (Supp. V) 1319, or which private citizens may enforce under Section 505, 33 U.S.C. (Supp. V) 1365. Further, regulations promulgated under Section 304 are not specifically identified among the actions of the Administrator subject to judicial review by the courts of appeals under Section 509(b), 33 U.S.C. (Supp. V) 1369(b).

[13] Those Sections are 301, 302, 306 and 307, each of which provides for a form of effluent limitation and 403, 33 U.S.C. (Supp. V) 1343, which deals with ocean discharges.

C. THE ADMINISTRATIVE AND JUDICIAL PROCEEDINGS IN THIS CASE

1. THE PROMULGATION OF EFFLUENT LIMITATIONS FOR THE INORGANIC CHEMICALS MANUFACTURING INDUSTRY

The Amendments directed the Administrator to implement them as expeditiously as possible. They contemplate that after December 31, 1974, discharges from point sources will be in conformity with a permit, Section 402(k), 33 U.S.C. (Supp. V) 1342(k). To facilitate promulgation of limitations for existing point sources to meet the 1977 and 1983 requirements, Section 304(b) directed that the regulations providing technological guidelines for effluent limitations be published within one year of enactment.[14]

Two weeks after the enactment of the Amendments, the Administrator requested, on October 31, 1972, the submission of proposals for programs to aid him in developing technological guidelines and effluent limitations and standards for existing point sources (covered by Sections 301 and 304(b)) and new sources (covered by Section 306) for various industrial categories (R. 6016). Among these were the Inorganic Chemicals Manufacturing Point Source Category involved in this case (R. 6215).

The general directions accompanying the request (R. 6015–6281) required that each industry be divided

[14] See *Natural Resources Defense Council, Inc.* v. *Train*, 510 F. 2d 692, 696 (C.A.D.C.). Section 306(b)(1)(A), 33 U.S.C. (Supp. V) 1316(b)(1)(A), also directed that standards of performance be promulgated within one year for new sources in 27 specified industrial categories, one of which was the inorganic chemicals manufacturing industry.

into categories and subcategories, and that the technological factors to be applied under Sections 301 and 304(b) be identified. Those steps were intended to support the promulgation of effluent limitations by the Administrator.[15] The Administrator entered into a contract with a private firm to prepare a Development Document for Effluent Limitations Guidelines and Standards of Performance for the Inorganic Chemicals, Alkali and Chlorine Industries. In June 1973, the Administrator circulated the resulting draft development document for public comment (A. 1–20).

[15] The direction stated:

"[(R. 6027)] In order to promulgate the required guidelines and standards, it is first necessary to (a) categorize each industry; (b) characterize the waste resulting from discharges within industrial categories and subcategories; and (c) identify the range of control and treatment technology within each industrial category and subcategory. Such technology will then be evaluated in order to determine what constitutes the 'best practicable control technology currently available,' what is the 'best available technology economically achievable' and, for new sources, what is the 'best available demonstrated control technology.'

"In identifying the technologies to be applied under Section 301, Section 304(b) of the Act requires that the cost of application of such technologies be considered, as well as the non-water quality environmental impact (including energy requirements) resulting from the application of such technologies. It is imperative that the effluent limitations and standards to be promulgated by the Administrator be supported by adequate, verifiable data and that there be a sound rationale for the judgments made. Such data must be readily identifiable and available and such rationale must be clearly set forth in the documentation supporting the regulations.

* * * * * * *

"The end result of the analysis undertaken by contractors will be the suggestion of effluent limitations associated with the technology identified by the contractor * * *. [R. 6034.]"

On August 6, 1973, the Administrator published an "Advance Notice of Public Review Procedures" concerning rulemaking with respect to "effluent limitations guidelines," and standards of performance for new sources (A. 21). 38 Fed. Reg. 21202. This announcement described the basic legal authority for the regulations to be proposed, the agency's general methodology in implementing its effluent limitations and the means by which the agency was seeking to achieve "the widest possible public scrutiny of the technical and legal basis for the regulations to be established * * *," including the availability of the draft development reports on the various categories (A. 22). This advance notice expressly relied upon Sections 301(b) and 304(b) as authority for the regulations to be proposed for existing point sources (A. 22, 40).

On October 11, 1973, the Administrator published a formal notice of proposed rulemaking for effluent limitations guidelines,[16] new source standards of performance, and pretreatment standards, for the Inorganic Chemicals Manufacturing Point Source Category (A. 61–151). 38 Fed. Reg. 28174 *et seq.* The notice stated the statutory authority under which the rules were to be promulgated: Section 301(b) with respect to effluent limitations for existing point sources; Section 304(b) with respect to guidelines for these effluent limitations; Section 306 with respect to standards of performance for new sources; and Section

[16] The Administrator used the phrase "effluent limitations guidelines" to encompass his combination of action under Section 301(b) and Section 304(b) into a single proceeding.

307(c), 33 U.S.C. (Supp. V) 1317 (c), for pretreatment standards for new sources (A. 62–64). The notice explained the methodology which had been followed in developing the effluent limitations, and summarized the conclusions of the development document for the industry with respect to categories, process descriptions, water use and waste water characteristics, pollution control and treatment technology, and non-water quality (other environmental) aspects of pollution control (A. 65–82).

The notice explained that the diversity of the industry prevented establishment of one limitation for the entire industry, but that separate limitations for each plant would be inconsistent with the intent of the Amendments and unworkable. The Administrator therefore proposed limitations which were uniform within "workable subcategories consistent with [the industry's] variations" (A. 83).[17] Separate specific

[17] The notice stated (A. 83):

"The inorganic chemicals manufacturing category is very large and diverse. In establishing effluent guidelines it was necessary to consider numerous factors which may predicate varying the guidelines to accommodate differences in plant size, age, geographical location, manufacturing processes employed and product mix. Comments from various industrial concerns indicate that they feel these variables justify further segmentation of the industry. The key issue is the degree to which the inorganic chemicals manufacturing category should be segmented for the purpose of establishing effluent guidelines and standards of performance. One extreme is to establish one limitation for the entire industry. Examination of the dissimilarities in manufacturing processes and wasteloads generated for each chemical reveal that this approach is technically unsound. On the other extreme, each chemical plant is

limitations were proposed for each of 22 subcategories of the inorganic chemicals manufacturing industry, established on the basis of the product manufactured and significant variations in manufacturing processes. Within each subcategory, separate limitations were proposed for each pollutant which was to be controlled by the regulation. These subcategories ranged, in alphabetical order, from the aluminum chloride production subcategory to the titanium dioxide production subcategory (A. 61).

The notice invited interested persons to participate in the rulemaking proceeding by submitting within 30 days written comments on all aspects of the proposed regulations, including alternative proposals. In inviting the latter, the notice indicated the Administrator's view that he was required to issue effluent limitations under Section 301 (A. 88):

> In the event comments address the approach taken by the agency in establishing an effluent limitation guideline or standard of performance, EPA solicits suggestions as to what alternative approach should be taken and why and how this alternative better satisfies the detailed requirements of sections 301, 304(b), 306 and 307 of the Act.

unique and presents specific treatment problems. If the regulations presented herein are to reflect every variation, it is necessary to have separate guidelines for each plant. This approach does not reflect the intent of the Act and is unworkable.

"The approach selected was to examine all variables and segment the industry into workable subcategories consistent with these variations. Twenty-two subcategories have been established based on the chemical product manufactured. In cases where two dissimilar processes are used to manufacture the same product, separate limitations have been established within the subcategory."

Several of the petitioners in this case objected to the proposed regulations on the ground that the Agency had proposed specific and uniform effluent limitations on a subcategory basis, rather than flexible "guidance" to be applied on a plant-by-plant basis by the issuers of permits under NPDES. *E.g.*, A. 155, 168–169, 188–189. The Assistant Administartor for Enforcement and General Counsel responded that the Agency would not "redirect its approach" and explained in greater detail the legal basis for the methodology underlying that approach (A. 192–198).

On February 4, 1974, EPA promulgated general provisions for effluent limitations to be applicable to all industrial categories (App. Br. 1c). 39 Fed. Reg. 4532 *et seq.*, 40 C.F.R. Part 401. These provisions included a statement of the scope and purpose of the effluent limitations guidelines, general definitions and the statutory authorization for such guidelines. The regulation cited Sections 301, 304, 306, 307, 316, and 402 as the legal basis of the Administrator's authority to promulgate effluent limitations for existing sources, standards of performance for new sources, and pretreatment standards for new and existing sources (App. Br. 3c, 7c–9c.). 40 C.F.R. 401.10, 401.12.

On March 12, 1974, the Administrator promulgated regulations specifying the effluent limitations for existing sources and standards of performance and pretreatment standards for new sources for the inorganic chemicals manufacturing industry (App. Br.

1b–79b). 39 Fed. Reg. 9612 *et seq.* The preamble again cited Sections 301, 304(b and c), 306(b and c), and 307 as the statutory basis for the Administrator's action (App. Br. 2b).[18] The Administrator summarized the comments of all participants and answered or commented upon each related group of comments. The preamble stated the revisions which had been made in the proposed regulations in light of the comments. The effluent limitations for each subcategory were expressed in terms of "single-number" quantities of pollutant which could be discharged per quantity of product per day. See p. 11, *supra*.

With the effluent limitations, the Administrator also published in final form the technological and economic basis upon which he had relied in developing them. The technological considerations were set forth in the "Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Major Inorganic Products Segment of the Inorganic Chemicals Manufacturing Point Source Category" (A. Exh. Vol. 5572), released March 1974.[19]

[18] It also referred to the notice of public review procedures of August 6, 1973, *supra*, p. 16, the notice of proposed rulemaking of October 11, 1973, *supra*, p. 16, and two development documents.

[19] This report specified subcategories within the industry (*id.* at 61), characterized water use and waste discharges within those subcategories (*id.* at 65); determined the characteristics of pollutants (*id.* at 183); and specified factors relating to control and treatment technology (*id.* at 189), including cost, energy and non-water quality aspects (*id.* at 229). It then described effluent reduction attainable through the application of the best practicable control technology currently available in each subcategory (*id.* at 313); and the effluent reduction attainable through application of the best available technology economically achieveable (*id.* at 331).

In April 1974, the Administrator published an "Economic Analysis of Effluent Guidelines for the Inorganic Chemical Industry" (A. Exh. Vol. 5419A). These two development documents were the final revised versions of earlier draft reports which had been circulated in connection with the proposed rulemaking. Together with the preamble to the regulations, and the regulations themselves, these documents set forth the "guidelines for effluent limitations" required by Section 304(b).

2. THE JUDICIAL PROCEEDINGS

Petitioners, eight chemical companies (Br. 1, n. 1), filed in the United States Court of Appeals for the Fourth Circuit timely petitions for review of the Administrator's action in promulgating the March 12, 1974, effluent limitations and new source standards, or intervened in such proceedings. See section 509(b)(1), 33 U.S.C. (Supp. V) 1369(b)(1). Insofar as existing sources were concerned, petitioners called their petitions for review "protective," contending that the Administrator had acted beyond his authority in promulgating single-number effluent limitations for such sources pursuant to Section 301(b), and that he was authorized only to promulgate flexible guidelines for effluent limitations under Section 304(b), to be

applied by issuers of permits to particular plants. Such guidelines, according to petitioners, were reviewable in the district courts rather than the courts of appeals.[20]

Some of the petitioners brought suit in the United States District Court for the Western District of Virginia raising the same issues as the petitions for review of the existing source regulations (A. 204). After briefing and argument, the district court dismissed for lack of jurisdiction, holding that the Administrator was authorized to promulgate effluent limitations under Section 301(b), that he had in fact done so, and that review of those regulations could be had only in the courts of appeals. *E. I. du Pont de Nemours and Co.* v. *Train,* 383 F. Supp. 1244 (App. 219–239).

Petitioners' appeal from that decision was consolidated with the pending petitions for review of both the new and existing source regulations. The court of appeals, however, rendered two separate decisions. In the first (*duPont I*), the court affirmed the district court's dismissal for lack of jurisdiction (App. 240–251. *E. I. du Pont de Nemours and Co.* v. *Train,* 528 F.2d 1136. In *duPont I,* the court separated the question of the Administrator's authority to issue

[20] Section 509(b)(1)(E), 33 U.S.C. (Supp. V) 1369(b)(1)(E), authorizes review in the courts of appeals of the Administrator's action, *inter alia,* "in approving or promulgating any effluent limitation or other limitation under section 301, 302, or 306 * * *." Review of actions taken pursuant to Section 304 is not mentioned in Section 509.

regulations under Section 301 from the issue of jurisdiction. It held that even if the Administrator's authority derived only from Section 304, the promulgation of guidelines under that section, because of the close interrelationship between Sections 301 and 304, was an "action 'in approving or promulgating any effluent limitation * * * under [section] 301'" (A. 246) and, accordingly, reviewable in the courts of appeals under Section 509(b)(1)(E), 33 U.S.C. (Supp. V) 1369(b)(1)(E).

In the second decision (*duPont II*) (App. 253–286), the court of appeals decided the merits of the questions presented in the petitions for review. The court held that the Administrator was authorized to promulgate effluent limitations under Section 301, that he had permissibly promulgated such regulations simultaneously with the promulgation of effluent guidelines under Section 304(b), and that the regulations need not take the form of "ranges" of discharge levels but could instead be issued as single-number limitations (see *infra,* pp. 48–53). The court further held that, for both existing and new sources, the Administrator's regulations are only "presumptively applicable," and that any source may, at the time of permit-issuance, rebut the application of the presumption to that particular plant.[21]

[21] The government's contention that the court's rule of "presumptive applicability" should not apply to new sources is the subject of its cross-petition in No. 75–1705.

Some of the regulations apply to more than one subcategory. The court set aside portions of those regulations dealing with "process waste water" and "process waste water pollutants" and with "catastrophic rainfall." The court also set aside portions of particular regulations dealing with 11 chemical products, on the ground that they were not adequately supported by the administrative record. Those rulings are not here challenged.

SUMMARY OF ARGUMENT

I

The language and structure of the 1972 Amendments show that the Administrator is authorized to promulgate generally applicable effluent limitations for existing point sources under Section 301(b). Contrary to petitioners' contentions, Congress did not intend that effluent limitations are to be established only in individual permit proceedings under Section 402 by application of the Administrator's Section 304(b) guidelines to the particular discharger.

This is shown by the language of Section 301 itself, which not only directs that effluent limitations "established pursuant to this section" shall be applied to all point sources (Section 301(e)) but expressly provides for waiver by the Administrator of the 1983 level effluent limitations upon a proper showing (Section 301 (c))—a provision which would be surplusage under petitioners' view. Other sections also reflect the premise that the Administrator will establish generally applicable limitations. Indeed, Section 304(b) directs that "[f]or the purpose of adopting or revising effluent limitations under this Act the Administrator shall * * * publish * * * regulations providing guidelines for effluent limitations." This indicates that it is the Administrator who is to adopt or revise the limitations required by Section 301. The same understanding is also reflected in the provisions establishing the state and federal permit systems (Section 402(a)(1), 402(b)); and in the requirement in Section 510, 33 U.S.C. (Supp. V) 1370, that states may not adopt less stringent effluent limitations than those in effect under the Amendments.

Finally, the statutory provisions for citizen enforcement suits (Section 505(a)(1), (f)(2), 33 U.S.C. (Supp. V) 1365 (a)(1), (f)(2)), and judicial review (Section 509(b)(1)) expressly refer to effluent limitations under Section 301. Section 509(b)(1) in fact provides for review "of the Administrator's action * * * in approving or promulgating any effluent limitation or other limitation under section 301 * * *."

Although the Amendments provide procedures for the enforcement of the requirments of Section 301, and requires that permits comply with applicable requirements thereunder, it nowhere expressly provides that guidelines published under Section 304(b) may be enforced, or reviewed, or must be incorporated into permits under Section 402.

Petitioners' arguments that only permit-issuers may establish effluent limitations are based upon hypertechnical or insignificant distinctions in the wording of the various sections of this complex statute. Section 304(b), upon which they heavily rely, does not support their position. That section does not confine the Administrator to publication of guidelines that state a numerical range of permissible effluent limitations to be selected and applied only by permit issuers in individual proceedings. Neither Section 304(b) nor Section 402 even refers to a "range" requirement. Moreover, the "range" for the industry as a whole is supplied by the differences among the effluent limitations for the various subcategories.

Insofar as Section 304(b) requires the Administrator to specify factors to be considered in establishing effluent limitations, Congress intended such specification to reflect his determination of the relevant technological criteria he is to apply in establishing effluent limitations under Section 301. It did not intend that the factors specified be reconsidered by permit issuers in individual permit proceedings, as petitioners assert.

The legislative history of the 1972 Amendments, particularly the Conference Report and the explanations of it, confirms that Congress intended the Administrator to establish nationally uniform minimum effluent limitations under Section 301(b) on the basis of industrial subcategories, not on a plant-by-plant basis through the issuance of permits, and that

it intended the effluent limitations to be uniform within each subcategory. In this way it sought to reduce the discharge of pollutants under a strict nationwide time table with which all dischargers would comply. This clearly defined policy would be defeated if effluent limitations could be established only in individual permit proceedings under Section 402, as petitioners contend.

The establishment of uniform national effluent limitations by the Administrator does not curtail or weaken the role Congress intended the states to have in the administration of the Amendments. The states still perform important functions, particularly in determining whether a particular existing point source comes within a subcategory and whether it qualifies for a variance from the generally applicable standards under Section 301, and in establishing its schedule for compliance. Moreover, the states retain the important power to adopt more stringent limitations than those established by the Administrator.

II

Because of the close inter-relationship between the guidelines under Section 304(b) and the effluent limitations under Section 301, the Administrator, for reasons of time and efficiency, combined the establishment of guidelines and effluent limitations into a single proceeding, at the end of which he made a single determination embodying the guidelines and the effluent limitations. This Court approved a similar combina-

tion of separate steps into a single administrative proceeding, adopted for reasons of administrative practicality, in *Federal Power Commission* v. *Moss*, 424 U.S. 494. Moreover, the requirements of Section 304(b) were satisfied by the development documents containing the technological data, the preamble to the formal regulations in issue, and the regulations themselves, which specify "the degree of effluent reduction attainable" as required by Section 304(b)(1)(A), (b)(1)(B), (b)(2)(A), and (b)(2)(B).

III

Petitioners err in contending that since the Administrator has no authority to establish effluent limitations under Section 301, the courts of appeals have no jurisdiction to review them. First, he has such authority. Second, the court of appeals' statutory jurisdiction to review effluent limitations under Section 509(b)(1) necessarily includes jurisdiction to determine whether the Administrator has power to establish them. *Citizens to Preserve Overton Park* v. *Volpe*, 401 U.S. 402, 415.

The effluent limitations under Section 301 and the guidelines under Section 304(b) were established in a single proceeding and are inextricably intertwined. They may be reviewed in a single proceeding by the court of appeals. Review of the guidelines in the district courts and the effluent limitations in the courts of appeals, as urged by petitioners, would result in a bifurcated system of review producing con-

fusion and delay in achieving the congressional requirement that existing point sources comply with strict, technology-based effluent limitations by 1977, stricter limitations by 1983, and would defeat attainment of the statutory goal to eliminate the discharge of pollutants by 1985.

ARGUMENT

I

SECTION 301 OF THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS EMPOWERS THE ADMINISTRATOR OF THE ENVIRONMENTAL PROTECTION AGENCY TO SET, FOR VARIOUS SUBCATEGORIES OF PARTICULAR INDUSTRIES, UNIFORM NATIONAL EFFLUENT LIMITATIONS FOR EXISTING POINT SOURCES OF POLLUTANTS

INTRODUCTION

Although the statutory provisions involved in this case are complex and intricate, the underlying legal issue is relatively simple. Section 301 of the Amendments provides for the establishment of "effluent limitations" for "all point sources of discharge of pollutants." Section 304(b) requires the Administrator of the Environmental Protection Agency, "[f]or the purpose of adopting or revising effluent limitations under this Act," to publish "regulations, providing guidelines for effluent limitations." Section 402 provides for the issuance of permits by the Administrator or by a state (under a state permit program approved by the Administrator) "for the discharge of any pollutant, or combination of pollutants," upon condition that such

discharge will meet the requirements of specified sections of the Amendments relating to the discharge of pollutants, including Section 301 but not Section 304.

The major question in the case is whether the Amendments empower the Administrator to adopt generally applicable effluent limitations for subcategories of industries that set a specific numerical limit upon the amount of a particular pollutant that all members of the subcategory may discharge—limitations which will then be incorporated in the individual permits that the Administrator or a state will issue to each point source, *i.e.*, to each individual discharger. Petitioners contend that the Administrator has no authority to issue such effluent limitations under Section 301, and that the only method by which effluent limitations may be established under Section 301 is through the application by permit-issuers of technological data specified in Section 304 guidelines. This is to be accomplished, according to petitioners, on a plant-by-plant basis in individual permit-issuance proceedings in which the permit-issuing authority establishes the precise numerical amount of polluting substances each point source may discharge.

Thus, in petitioners' view the effluent limitations may be established only in each of the 40,000 or more individual permits to be issued to existing point sources.[22] The government submits—as six of the seven

[22] As of June 30, 1976, the Environmental Protection Agency's Formal Planning and Reporting System showed that 42,064 industrial permits had been issued or applied for.

courts of appeals that have considered this question have held [23]—that the Administrator's authority is not so moribund, and that he may adopt generally applicable effluent limitations under Section 301 that set the precise numerical amount of permissible pollution for subcategories of industry.

The basic design of the Amendments was to provide for the development of national standards by which pollution of our waters would be controlled and reduced and, by 1985, hopefully eliminated (Section 101(a), "declarations of goals and policy"). Earlier attempts to deal with the water pollution problem had failed, because both the methods used in the prior legislation to improve water quality and the federal permit system under the Refuse Act of 1899 had proved inadequate. In the 1972 Amendments, Congress adopted a new approach.

It undertook to control water pollution at the pollution source by directly limiting the amount of pollutants discharged to the minimum that technology

[23] In addition to the Court of Appeals for the Fourth Circuit in the present case, the District of Columbia, Second, Third, Seventh, and Tenth Circuits have upheld the Administrator's authority. *American Frozen Food Institute* v. *Train*, C.A.D.C., Nos. 74–1464, 74–1513, 74–1840, decided May 11, 1976; *Hooker Chemicals & Plastics Corp.* v. *Train*, 537 F. 2d 620 (C.A. 2); *American Iron & Steel Institute* v. *Environmental Protection Agency*, 526 F. 2d 1027 (C.A. 3); *American Meat Institute* v. *Environmental Protection Agency*, 526 F. 2d 442 (C.A. 7); *American Petroleum Institute* v. *Environmental Protection Agency*, C.A. 10, Nos. 74–1465, 74–1466, 74–1621, 74–1622, decided August 11, 1976. Only the Eighth Circuit has held to the contrary. *CPC International Inc.* v. *Train*, 515 F. 2d 1032.

permits. It thus shifted the approach to the problem from the prior emphasis on water quality to technology-based effluent limitations designed to restrict and ultimately to end the discharge of pollutants into our navigable waters.

The 1972 Amendments adopted a three-part plan to deal with pollution from existing sources. First, it was necessary to identify the particular pollutants that were creating the problem in particular industries, to ascertain and evaluate the best technology available and acceptable to control such pollution, and to estimate the extent of the control of pollution that such technology could achieve by designated target dates. This initial aspect of the program was dealt with in Section 304, which required the Administrator by specified dates to develop and publish information about the causes of pollution and the best available technology for dealing with it. The guidelines are required to "identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of the best practicable control technology currently available for classes and categories of point sources" and to "specify factors to be taken into account in determining the control measures and practices to be applicable to point sources * * * within such categories or classes."

The next step in the program—the conversion of the technological information set forth in the guidelines into binding, enforceable pollution limitations—

was to be accomplished through the promulgation of "effluent limitations" by the Administrator under Section 301. The purpose of the effluent limitations was to translate into specific figures the maximum permissible pollution by particular classes and categories of polluters. The effluent limitations thus were based upon and reflected the technological data developed under Section 304(b).

Finally, the effluent limitations under Section 301 were to be applied to the approximately 40,000 existing industrial point sources through the NPDES permit system. The permits to be issued either by the Administrator or by the state under a permit program the Administrator had approved, would specify maximum permissible levels of pollution for each individual discharger through the application of the effluent limitations to the particular point source. State-issued permits at a minimum must meet the federally-prescribed effluent limitations; the state, however, may itself impose more stringent limitations (Section 510).

As we shall show, both the language and the structure of the Amendments demonstrate that Congress authorized the Administrator to promulgate effluent limitations on the basis of industrial subcategories that specify precise levels of permissible pollution for all firms in the subcategory. We shall also show that the legislative history of the 1972 Amendments confirms that the Administrator has this authority. This history shows that Congress explicitly intended that the Administrator would set effluent limitations on

this basis, and that he is not required to depend on the issuance of individual permits in order to establish for individual point sources the specific requirements for controlling pollution in the particular industrial subcategories that are specified in the guidelines.[24] It further shows that Congress intended there to be uniform national effluent limitations governing all members of the particular subcategory—an objective that could not be accomplished if the only method by which effluent limitations could be applied is through the permit system.

Finally, we shall show that the fact that in this case the Administrator promulgated the guidelines and adopted the effluent limitations in a single proceeding was a permissible exercise of his broad statutory authority to take effective measures "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (Section 101(a) of the Amendments).

This Court has recognized that the Administrator's interpretation of the Water Pollution Control Act, like his interpretation of the Clean Air Act, is entitled to considerable weight if it is "reasonable" and there is no "cogent argument that it is contrary to congressional intentions * * *." *Environmental Protection Agency* v. *California ex rel. State Water Resources Control Board*, No. 74-1435, decided June 7,

[24] If uniform limitations have not yet been issued for a particular industrial category, the Amendments provide that the Administrator may issue a permit containing "such conditions as * * * are necessary to carry out the provisions of this Act." Section 402(a)(1).

1976, slip op. 26 (Water Act); ***Union Electric Co.*** v. ***Environmental Protection Agency***, No. 74-1542, decided June 25, 1976, slip op. 8 (Clean Air Act); ***Train*** v. ***Natural Resources Defense Council***, 421 U.S. 60, 75 (Clean Air Act). Since the Administrator's construction of the 1972 Amendments satisfies both of these criteria, the Court should uphold it.[25]

A. THE LANGUAGE AND STRUCTURE OF THE AMENDMENTS SHOW THAT THE ADMINISTRATOR IS AUTHORIZED TO PROMULGATE EFFLUENT LIMITATIONS UNDER SECTION 301 (b)

Numerous provisions of the statute, as well as its overall structure and design, show that the Adminis-

[25] Petitioners contend (Br. 73-75) that the Administrator's interpretation is entitled to little, if any, weight because it was not contemporaneous or consistent, but rather constituted a change from his alleged original intention not to establish effluent limitations under Section 301(b) but only to establish guidelines. From the outset, however, the Administrator contemplated promulgating effluent limitations under Section 301(b). As detailed in the Statement (pp. 14-21, *supra*), two weeks after the enactment of the Amendments the Administrator requested the submission of proposals to aid him in developing both guidelines under Section 304(b) and effluent limitations under Section 301. Throughout the remainder of the proceedings, the various public notices specifically referred to both sections, and the Administrator's final action was taken under both of them. Although the Administrator initially may have stressed the Section 304 guidelines—because of the requirement that they be promulgated within one year after the enactment of the Amendments (Section 304(b))—from almost the date of the enactment of this legislation the Administrator had made clear his intention to establish both guidelines under Section 304(b) and effluent limitations under Section 301(b) and he did precisely that, combining the two steps in a single set of regulations.

trator is authorized to promulgate effluent limitations under Section 301(b).

1. THE LANGUAGE OF VARIOUS PROVISIONS OF THE AMENDMENTS SHOWS THAT THE ADMINISTRATOR HAS AUTHORITY TO ESTABLISH EFFLUENT LIMITATIONS UNDER SECTION 301(b)

a. The starting point is Section 301 itself. It provides that there shall be achieved by July 1, 1977, "effluent limitations for point sources * * * which shall require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 304(b) of this Act," and by July 1, 1983, "effluent limitations for categories and classes of point sources," which also are to be based upon the Administrator's guidelines under Section 304(b) (Section 301(b)). Subsection (e) states:

> Effluent limitations established pursuant to this section or section 302 of this Act shall be applied to all point sources of discharge of pollutants in accordance with the provisions of this Act.

These provisions unequivocally provide that "effluent limitations" are to be established under Section 301. Those limitations are separate and distinct from the requirement in Section 402 that permits to be issued for the discharge of pollutants by point sources will "meet * * * all appropriate requirements under section 301 * * *." Indeed, the obvious intendment of Section 402 is that permits cannot be issued unless they require compliance with the "[e]ffluent limitations established" under Section 301 (Section 301(e)).

Although Section 301 does not explicitly provide

that it is the Administrator who is to establish the effluent limitations, that is its clear and necessary implication. As shown below, Congress intended that the effluent limitations be established on a uniform national basis (pp. 59–67); only the Administrator is capable of accomplishing that objective. Uniform effluent limitations could not be achieved if the only way to impose them was by the particularization of the guidelines promulgated under Section 304 in the 40,000 permits for existing point sources, a large number of which will be issued by the 27 states that now have approved permit programs (Pet. Br. 6, n. 9).[26]

The Administrator's authority to establish generally applicable effluent limitations under Section 301 is confirmed by his power under Section 501(a), 33 U.S.C. (Supp. V) 1361(a), of the Amendments "to prescribe such regulations as are necessary to carry out his functions under this Act." When a statute confers such authority, "the validity of a regulation promulgated thereunder will be sustained so long as it is 'reasonably related to the purposes of the enabling legislation.'" *Mourning* v. *Family Publications Service, Inc.*, 411 U.S. 356, 369, quoting with approval *Thorpe* v. *Housing Authority of the City of Durham*, 393 U.S. 268, 280–281.

Unless Section 301 authorizes the Administrator to promulgate effluent limitations for categories of point sources, one subsection of that section would be surplusage. Section 301(c) provides that "[t]he Adminis-

[26] The Administrator has also approved a permit-issuing program for the Virgin Islands. 41 Fed. Reg. 30383.

trator may modify the requirements of subsection (b) (2)(A) of this section [requiring the achievement by 1983 of 'effluent limitations for categories and classes of point sources'] with respect to any point source for which a permit application is filed after July 1, 1977, upon a showing" that the modification represents "the maximum use of technology within the economic capability of the owner or operator" and "will result in reasonable further progress toward the elimination of the discharge of pollutants." This provision authorizes the Administrator to grant relief on a case-by-case basis from the general effluent limitations then in effect, in order to allow a permit to impose less stringent requirements.

If the only way that effluent limitations could be imposed were through the permit procedures, there would be no need for a statutory provision authorizing the Administrator to exempt from effluent limitations a particular point source for which a permit is sought. As the Court of Appeals for the Third Circuit has noted, "§ 301(c) itself seems to support the Administrator's position by presupposing the existence of a section 301 effluent limitation which the Administrator can relax." *American Iron & Steel Institute* v. *Environmental Protection Agency*, *supra*, 526 F. 2d at 1037, n. 15.

b. Section 302, to which, as noted, Section 301(c) refers, deals with effluent limitations designed to attain or maintain water quality. It provides that whenever the Administrator concludes that discharges of pollutants from a point source or group of point

sources "with the application of effluent limitations required under section 301(b)(2) * * * would interfere with the attainment or maintenance of [the requisite quality of water in particular waters]," then "effluent limitations (including alternative effluent control strategies) for such point source or sources shall be established." Section 302(b)(1) provides that "[p]rior to establishment of any effluent limitation pursuant to subsection (a) of this section, the Administrator shall issue notice of intent to establish such limitations" and hold a hearing. Section 302(c) provides that the establishment of water-quality related limitations "shall not operate to delay the application of any effluent limitation established under Section 301 * * *."

Section 302 thus unequivocally provides that the Administrator is to establish effluent limitations under that section designed to deal with the special impact upon water quality of the discharge of pollutants by particular point sources. It would be anomalous for Congress to have given him this authority to deal with the special situation covered by Section 302 but to have denied him the authority to promulgate the general effluent limitations required under Section 301, to which Section 302(c) expressly refers.

c. Section 304—the guideline section—itself recognizes the authority of the Administrator to promulgate effluent limitations under Section 301. Section 304 (b) directs that, "[f]or the purpose of adopting or revising effluent limitations under this Act the Administrator shall * * * publish * * * regulations, pro-

viding guidelines for effluent limitations." The requirement that the Administrator publish guidelines "[f]or the purposes of adopting * * * effluent limitations under this Act" indicates that it is the Administrator who will adopt the effluent limitations expressly required by Section 301 for "classes and categories of point sources," [27] and that those effluent limitations will apply the standards and principles set forth in the guidelines.

d. Section 401(a)(1) requires an applicant for a federal permit to submit a certification from the state involved that the discharge will comply with, among other provisions, Section 301 or, in the case of "any such activity for which there is not an applicable effluent limitation * * * under [section] 301(b)," the state must so certify. This requirement recognizes that there will be effluent limitations established under Section 301(b) which the discharge authorized in a federal permit issued subsequent to the establishment of the effluent limitations must satisfy.

e. The permit provisions in Section 402 of the Amend-

[27] The "effluent limitations" to be achieved by July 1977 are "for point sources," whereas those to be achieved by July 1983 are "for classes and categories of point sources." The difference in language, however, does not indicate that for the earlier period the "effluent limitations" were to be established for each individual point source separately, through the permits to be issued for them and that effluent limitations for "classes and categories of point sources" were not to be achieved until 1983. The omission of the term "classes and categories" from Section 301(b)(1)(B) is of no significance, because Section 304(b) requires "guidelines for" classes and categories both in 1977 (Section 304(b)(1), 33 U.S.C. (Supp. V) 1314(b)(1)), and 1983 (Section 304(b)(2), 33 U.S.C. (Supp. V) 1314(b)(2)).

ments recognize that under Section 301—as under Sections 302, 306 and 307—effluent limitations will be established. The Administrator may issue permits, and approve state permit programs, only if such permits meet the "applicable requirements" of those four sections. The major requirement of those four sections, as we have noted, is the effluent limitations that the Administrator has promulgated thereunder.

f. Section 510 states that the Act ~~Amendments~~, 33 U.S.C. (Supp. V) 1317, does not bar the states from "adopt[ing] or enforc[ing] (A) any standard or limitation respecting discharges of pollutants." It provides, however, that any state "effluent limitation" or other limitation or prohibition shall not be less stringent than any "effluent limitation, or other limitation, effluent standard, prohibition, pretreatment standard, or standard of performance * * * in effect under this Act." The "effluent limitation[s] * * * in effect under this Act" necessarily are the generally applicable limitations for industrial categories established under Section 301 and the other sections providing for effluent limitations (Sections 302, 306, 307). They could not be the particular limitations on individual discharges contained in state-issued permits, or the section would be meaningless.

g. Finally, the statutory provisions for citizen enforcement suits and judicial review explicitly recognize the Administrator's authority to adopt effluent limitations under Section 301. Section 505(a)(1) permits any citizen to bring a civil action against any person "who is alleged to be in violation of (A) an effluent

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standard or limitation under this Act * * *." For purposes of Section 505, the term "effluent standard or limitation" is defined to include "an effluent limitation or other limitation under Section 301 or 302 of this Act" (Section 505(f)(2)). Section 509(b)(1) provides for judicial review in the court of appeals "of the Administrator's action * * * in approving or promulgating any effluent limitation or other limitation under section 301, 302 or 306 * * *."[28] The former provision thus recognizes that effluent limitations will be established under Section 301, and the latter provision explicitly indicates that it is the Administrator who will promulgate them.

The foregoing provisions for citizen enforcement and for judicial review also explicitly provide for enforcement of permit requirements under Section 402.[29]

[28] Petitioners argue (Br. 82–83) that the term "approving * * * any effluent limitation" refers to the failure of the Administrator to veto a state permit under Section 402(d) and was designed to provide opportunity for federal court review of state permits. They ignore, however, the reference to the "promulgating" of an effluent limitation; their explanation of this provision would not cover the latter situation. Moreover, it is unlikely that Congress intended by this language to provide for judicial review of the Administrator's refusal to veto a state permit. On the contrary, this provision was designed to permit review of the Administrator's affirmative action in "approving or promulgating any effluent (or other) limitation." The failure to veto a state permit would not normally be viewed as an approval of it. *Mianus River Preservation Committee v. Environmental Protection Agency*, C.A. 2, No. 75–4253, decided July 12, 1976 (state-issued permit not reviewable as Administrator's action under Section 509).

[29] See Section 505(f)(6), defining "effluent standard or limitation" for the purpose of citizens' suits to include "a permit or condition thereof issued under Section 402 of this Act,"; and Section 509(b)(1)(F), providing court of appeals review of the Administrator's action "in issuing or denying any permit under Section 402."

If, as petitioners contend, effluent limitations could be established and applied only in permits under Section 402, the provisions for review and enforcement of Section 301 effluent limitations would be surplusage, contrary to the familiar principle that statutes must be read to give effect to each provision. *United States* v. *Menasche*, 348 U.S. 528, 538–539; *American Iron & Steel Institute* v. *Environmental Protection Agency*, 526 F. 2d 1027 (C.A. 3); *American Meat Institute* v. *Environmental Protection Agency*, 526 F. 2d 442 (C.A. 7).[30]

[30] The Eighth Circuit attempted to avoid this problem by treating the references to Section 301 in the enforcement and review sections as limited to Section 301(f), which prohibits discharge of poison warfare agents and high level radiological wastes. *CPC International Inc., supra*, 515 F. 2d at 1043. Section 502(11) defines an effluent limitation as "any restriction established by a State or the Administrator * * *." Since the restriction on discharge of poison warfare agents and radiological waste is established by the statute itself and not by the Administrator, it is not an effluent limitation. It is therefore "another limitation" under the provisions in Sections 505(a)(1) and 505(f) that authorize citizen suits to enforce "an effluent limitation or other limitation under Section 301 or 302 of this Act." *American Iron & Steel Institute, supra*, 526 F. 2d at 1038. The references in the citizens enforcement and judicial review provisions to the "effluent limitations" under Section 301 therefore are to something other than the absolute prohibition in Section 301(f) against the discharge of any poison warfare agents or radiological wastes. As we have shown in the text (*supra*, pp. 41–42), they are to the effluent limitations established by the Administrator under Section 301(b).

Petitioners contend (Br. 80) that the reference in Section 505(f)(2) to "effluent limitation or other limitation under Section 301" is to individual variances from the effluent limitations under that section that may be granted to permit holders under Section 301(c); and that the citizen suits that may be brought

2. THE INTERRELATIONSHIP AMONG VARIOUS PROVISIONS OF THE AMENDMENTS CONFIRMS THE ADMINISTRATOR'S AUTHORITY TO ESTABLISH EFFLUENT LIMITATIONS UNDER SECTION 301(b)

The interrelationship among the provisions of the Act dealing with effluent limitations (Sections 301, 302, 306, 307), guidelines for such limitations (Section 304), federal enforcement (Section 309) and permits (Section 402), confirms that the Administrator has authority to establish effluent limitations under Section 301, and is not limited to promulgating guidelines for such limitations under Section 304, which are to be applied to particular point sources solely through permits.

Section 301(a) makes unlawful the discharge of any pollutant "[e]xcept * * * in compliance with this sec-

under Section 505(a) to challenge effluent limitations may challenge only such variances. Although Section 505(f) defines an effluent limitation to include "a permit or condition thereof," a citizen suit relating to the variance presumably would challenge the relaxation of the effluent limitation under Section 301(b) that the variance sanctions. Such a challenge would not appear to be a claim of violation of the effluent limitation but rather a challenge to the variance from the limitation. Similarly, the Administrator's grant of a variance under Section 301(c) would not appear to be challengeable as "a failure of the Administrator to perform any act or duty under this Act which is not discretionary with the Administrator," which a citizen may challenge under Section 505(a)(2).

The grant of a variance under Section 301(c) is reviewable in the court of appeals under Section 509(b)(1)(E) and (F) as an action "in approving * * * any effluent limitation or other limitation under section 301 * * *" or "in issuing or denying any permit under section 402," and not in a citizen suit under Section 505(a). Whether a citizen could maintain an action challenging such variance would depend upon whether he is an "interested party" under Section 509(b)(1).

tion and sections 302, 306, 307, 318, 402 and 404 of this Act." Section 309(a) authorizes the Administrator to enter a compliance order and to seek injunctive relief against any person who violates "section 301, 302, 306, 307, or 308 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act by [him] or by a State"; it also imposes civil penalties for violation and criminal penalties for willful and negligent violation of those provisions or of such permits (Sections 309(c)(1), 309(d)). Finally, Sections 402(a)(1) and 402(b)(1)(A) and (B) require that permits issued by the Administrator or State must comply with all "applicable requirements under sections 301, 302, 306, 307, 308 and 403 of this Act."

The significant thing about these provisions for this case is that none of them requires compliance with the guidelines promulgated under Section 304, authorizes enforcement proceedings against noncompliance therewith, or makes such noncompliance illegal. Discharges of pollutants and permits for such discharges are required to comply with the effluent limitations in Sections 301, 302, 307 and 308, not with the guidelines for such limitations under Section 304.[31]

Petitioners' argument grossly distorts and upsets the entire statutory plan, since it authorizes only the

[31] Section 402(d)(2), 33 U.S.C. (Supp. V) 1342(d)(2), empowers the Administrator to veto permits "outside the guidelines and requirements of this Act." However, the term "guidelines" here refers to guidelines under Section 304(h), concerning uniform monitoring, reporting and information requirements, not to Section 304(b). See section 402(c)(2), 33 U.S.C. (Supp. V) 1342(c)(2).

promulgation of nonenforceable guidelines for effluent limitations without the binding and enforceable limitations themselves which the permits are required to meet. Congress certainly did not intend to leave such a gaping loophole in the statute when it provided in Section 301(e) that "[e]ffluent limitations established pursuant to this section or section 302 of this Act shall be applied to all point sources of discharge of pollutants in accordance with the provisions of this Act."

3. THE OTHER STATUTORY PROVISIONS UPON WHICH PETITIONERS RELY ARE NOT INCONSISTENT WITH THE ADMINISTRATOR'S AUTHORITY TO ESTABLISH EFFLUENT LIMITATIONS UNDER SECTION 301(b)

Petitioners seek to avoid the compelling effect of the foregoing analysis by a series of hypertechnical arguments that focus on minor distinctions in the wording of various sections of the Act, largely ignore the basic structure and design of the statute, and would seriously weaken the effectiveness of the Amendments to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (Section 101(a)).

Petitioners point out (Br. 58–59) that Section 306 (b)(1)(B) requires the Administrator to "propose and publish regulations establishing Federal standards of performance for new sources * * *." They argue that where Congress desired uniform national standards, as in the case of new sources (Section 306), it used the term "standards," and that the absence of that term in Sections 301 and 304 indicates that in those sections Congress did not contemplate a uniform standard for the entire country.

This semantic distinction, however, does not refute the numerous statutory provisions discussed above which recognize the authority of the Administrator to promulgate effluent limitations on a national basis. Moreover, the argument incorrectly assumes that Congress intended the terms "limitation" and "standard" to have substantially different meanings. To the contrary, the statute as a whole shows that Congress used these terms as equivalents, and did not intend the use of one or the other to affect the scope of the Administrator's authority.

For example, as shown above (p. 6), the "standards of performance" to be established for new sources under Section 306(b), as restrictions on discharge, are "effluent limitations." Section 502(11), 33 U.S.C. (Supp. V) 1362 (11). Section 316 dealing with thermal pollution, refers in subsection (b) to "[a]ny standard established pursuant to section 301 or section 306 * * *."[32] Section 509(b)(1)(E), however, provides for judicial review of the Administrator's action in approving or promulgating "any *effluent limitation* or other limitation under Section 301, 302 *or 306*" (emphasis added). See *American Meat Institute*

[32] *Amicus Curiae* American Petroleum Institute argues that the reference to Section 301 standards means the pretreatment standards which are referred to in Sections 301(b)(1)(A)(ii) and 301(b)(2)(A)(ii). This explanation is implausible. If Congress meant pretreatment standards, it would have referred directly to Section 307, which governs both toxic pollutants and pretreatment standards. Moreover, it would be anomalous for Section 301(b) to apply to users of publicly owned treatment works, but not to existing point sources which discharge directly to navigable waters. See, 1 Leg. Hist. 263.

v. *Environmental Protection Agency, supra,* 526 F. 2d at 450, n. 17.

The terms "standards" and "limitations" are also used interchangeably in the legislative history.[33]

4. SECTION 304(b) DOES NOT REQUIRE THE ADMINISTRATOR TO ESTABLISH RANGES OF PERMISSIBLE POLLUTION FOR, OR SPECIFIC FACTORS TO BE CONSIDERED BY, THE ISSUERS OF PERMITS

Petitioners also make an elaborate argument that certain provisions of Section 304(b) are inconsistent with the establishment of specific numerical effluent limitations under Section 301, and therefore show that Congress did not authorize the Administrator to establish such limitations. They contend that Section 304(b) requires the Administrator to publish guidelines that (1) state only a numerical range for permissible effluent limitations, which sets the upper and lower limits that permits must specify, but leaves it to the issuer of the permit to select within that range the exact effluent limitations appropriate for the particular discharger; and (2) specify the factors upon which the permit issuer is to rely in setting effluent limitations in individual permits. Both the language of Section 304(b) and its legislative history refute these contentions.[34]

[33] See, *e.g.*, the Senate debate immediately preceding the vote to override the President's veto, where Senator Williams and Senator Percy referred to the need for uniform "effluent standards." 1 Leg. Hist. 132, 134.

[34] The court of appeals in this case and four other courts of appeals have rejected this contention. *American Frozen Food Institute* v. *Train, supra,* slip op. 63; *Hooker Chemicals & Plastics*

a. *Section* 304(*b*) *does not require the Administrator to establish ranges of permissible polluting discharges within which the issuer of permits is to set separate effluent limitations, for particular dischargers.* Nothing in either Section 304(b) or Section 402 provides for the Administrator to establish a range within which levels of permissible pollution are to be determined, or suggests that the issuer of permits is given discretion to set effluent limitations for particular dischargers on the basis of the Administrator's guidelines. The statute nowhere uses the word "range" and, as the District of Columbia Circuit noted, "no such requirement was enacted in statutory form." *American Frozen Food Institute* v. *Train, supra,* slip op. 63.[35]

As noted (*supra*, pp. 7-8, 13, 44-45), both federal and state permits must insure compliance with all applicable requirements of the effluent limitations contained in Sections 301, 302, 306 and 307; there is no requirement, however, that such permits comply with the guidelines for effluent limitations established under Section 304(b). This omission of compliance

Corp. v. *Train*, 537 F. 2d 620, 628-629 (C.A. 2); *American Meat Institute* v. *Environmental Protection Agency*, 526 F. 2d 442 (C.A. 7); *American Petroleum Institute* v. *Environmental Protection Agency*, C.A. 10, No. 74-1465, decided August 11, 1976. The only contrary decision, that of the Third Circuit in *American Iron & Steel Institute* v. *Environmental Protection Agency*, 526 F. 2d 1045, upon which petitioners heavily rely, is, for the reasons set forth in the text, erroneous.

[35] See also *American Petroleum Institute* v. *Environmental Protection Agency, supra*, slip op. 18-22; *American Paper Institute* v. *Train*, C.A.D.C., No. 74-1480, decided August 6, 1976.

with the "guidelines for effluent limitations" is highlighted by the express requirement in Section 402(c)(1) that state permits must comply with the Administrator's "guidelines issued under section 304(h)(2)" for establishing uniform application forms, minimum reporting requirements for discharges, and minimum procedural requirements for monitoring and reporting.

No requirement to establish "ranges" to guide permit issuers can be implied from the direction to the Administrator in Section 304(b) to "identify in terms of amounts of constituents and chemical, physical and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of the best practicable control technology currently available for classes and categories of point sources * * *." Measuring "the degree of effluent reduction attainable," in terms of amounts of constituents and characteristics of pollutants, implies the establishment of specific effluent limitations. The word "amounts" is in the plural form not to suggest a range of values, but to be consistent with the plural form of "constitutents," "pollutants," and "classes and categories".

The Senate Report on the Amendments twice refers to a "range" of discharge levels (S. Rep. No. 92–414, *supra,* at 50, 2 Leg. Hist. 1468):

> In defining best practicable for any given industrial category, the Committee expects the Administrator to take a number of factors into account. These factors should include the age of the plants, their size and the unit processes

> involved and the cost of applying such controls. In effect, for any industrial category, the Committee expects the Administrator to define a range of discharge levels, above a certain base level applicable to all plants within that category. * * *
>
> The Administrator should establish the range of best practicable levels based upon the average of the best existing performance by plants of various sizes, ages, and unit processes within each industrial category.[36]

Insofar as Congress expected that there would be a "range" of permissible amounts of pollution "above a certain base level" within a category, its expectation has been satisfied. The Administrator has promulgated minimum effluent limitations for designated subcategories. "Ranges" of permissible pollution automatically result when an entire point source category (*e.g.,* "iron and steel manufacturing," "pulp and paper mills," or "inorganic chemicals manufacturing" (see Section 306(b)(1)(A)) is subdivided, and uniform levels are set to reflect the technological conditions within each subcategory.

While Congress desired the maximum degree of uniformity possible (see discussion, *infra,* pp. 59–67), it realized that broad industrial "classes and categories" are complex and diverse. Establishment of a single discharge level for pollutants in any given "category" of industry (*e.g.,* "iron and steel manufacturing") (see Section 306(b)(1)(A)) would be unworkable.

[36] Senator Muskie repeated this statement during the Senate debate on the Conference Report. 1 Leg. Hist. 169–170.

For each category of industry, therefore, Congress expected a range of subcategories within which uniform standards could be practicably applied. Effluent limitations for each of these subcategories, determined on the basis of the best control technology in effect (Section 301(b)), thus provide a range covering an entire industrial category. As the Second Circuit recently noted in *Hooker Chemicals & Plastics Corp.* v. *Train, supra,* 537 F. 2d at 630:

> * * * Congress intended that the regulations establish a single discharge level for a given subcategory. This is implicit in the Congressional choice of the superlative form in the statutory language requiring achievement of the degree of effluent reduction attainable by application of "*best*" technology. * * * We * * * believe that whenever Congress spoke of "ranges" in the debates over the Act, it meant only the spectrum comprised of varying discharge levels on a subcategorical, rather than individual, basis. [Emphasis in original.]

Accord, *American Paper Institute* v. *Train, supra.*

Moreover, even within subcategories, specific effluent limitations constitute a minimum requirement. More stringent limitations may be imposed by the state or the Administrator in order to meet state water quality standards under Sections 301(b)(1)(C) and 303; and by the states under Section 510, 33 U.S.C. (Supp. V) 1370. Thus, as the court of appeals noted (A. 26), "the use of a single number limitation for discharge permits any discharge from 0 up to the allowed amount."

Indeed, if petitioners are correct that the Administrator's guidelines must include ranges within which the issuers of permits may set the maximum amounts of pollution for particular point sources, there would be little reason for the authority given the Administrator in Section 301(c) to modify the effluent limitations for 1983 under Section 301(b)(2)(A) in a permit for a particular point source. As we have shown (*supra*, pp. 37–38), the variance provision in Section 301(c) contemplates that the effluent limitations established under Section 301(b) will provide a uniform numerical limitation for all point sources within a particular industrial category or class. Moreover, formulating the guidelines in terms of a range of permissible pollution rather than an exact numerical limitation would be inconsistent with the congressional objective of eliminating all discharge of pollutants by 1985; with the Administrator's authority under Section 301(b)(2)(A) to prohibit any discharge of pollutants in the 1983 effluent limitations; and with his authority under Section 304(b)(3) to "identify control measures and practices available to eliminate the discharge of pollutants from categories and classes of point sources * * *."

b. *Section 304(b) does not require the Administrator to specify in the guidelines the factors that permit issuers are to consider in granting permits to individual dischargers.* Petitioners make a related contention based upon the language in Section 304(b)(1)(B) that the guidelines are to "specify factors to be taken into account in determining the control measures and

practices to be applicable to point sources" and to consider a list of "[f]actors relating to the assessment of the best practicable control technology available." They argue (Br. 73) that these requirements were intended "to assure that the wide range of differences in individual plants [be] taken into account by the permit authority." Under their theory, the permit issuers, instead of applying general effluent limitations framed in terms of industrial classes and categories, are to apply the factors plant by plant—a procedure that inevitably will result in wide variations in permissible discharge of pollutants among members of the same subcategory.

This argument, like the contention with respect to the specification of ranges of permissible pollution, just discussed, similarly undermines the basic congressional purpose of establishing uniform effluent limitations for industrial subcategories, which the individual permits must meet. Indeed, the requirement of specification of factors for permit issuers which petitioners would read into the Amendments would be unnecessary unless the Administrator's guidelines also are required to provide ranges of permissible pollution—which, as just shown, they are not required to do.

These requirements in Section 304(b) are not intended to provide guidelines for the issuance of permits, but to specify the factors the Administrator is to consider in establishing "guidelines for effluent limitations"—upon which limitations themselves to be established under Section 301(b) will be based. See *supra*, pp. 43-45. As we have noted before, it is the

effluent limitations and not the guidelines therefor that are to be applied in issuing the permits.

Section 304(b)'s requirement for regulations providing guidelines for effluent limitations is "[f]or the purpose of adopting or revising effluent limitations." For the 1977 step, the statute directs the Administrator to specify in the regulations "factors to be taken into acount in determining the control measures and practices to be applicable to point sources," and to assess the "best practicable control technology currently available to comply with subsection (b)(1) of Section 301 * * *." The Administrator is to take these factors into account in establishing the guidelines upon which the effluent limitations will be based, and not in issuing permits. The statutory directive with respect to factors instructs the Administrator how to prepare the guidelines and apply them in establishing the effluent limitations under Section 301(b); it does not purport to instruct him or the states with respect to the issuance of permits under Section 402(b). On the contrary, the very requirement that he "specify" indicates that he is to make a choice as to which factors he deems relevant to the determination he must make concerning "the control measures and practices to be applicable to point sources" (Section 304(b)(1)(B)).

In addition to requiring the Administrator to specify the factors he chooses to take into account, Section 304 lists factors that he must consider (Sections 304(b)(1)(B) and (b)(2)(B)). For the 1977 step, these are "the total cost of application of technology

in relation to the effluent reduction benefits to be achieved from such application * * * the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, [and] nonwater quality environmental impact (including energy requirements) * * *."

In promulgating the effluent limitation guidelines for the inorganic chemicals manufacturing industry, the Administrator complied with these requirements by specifying and analyzing all the relevant factors, including those specifically mandated by the statute. The development document for this industry contains hundreds of pages analyzing the factors. See, *e.g.*, A. Exh. Vol. 5427–5569, 5593–5643, 5771–5809, 5810–5893. The factors were further "specified" by defining subcategories and subdivisions within the industry which reflect them.[37] These subcategories reflect, *inter alia*, the production process, type of operation, type of equipment, final product, scale of production, age of the source, and other technological considerations (A. 67–82). The Administrator also took into account various economic factors affecting the industry (A. 79–80; App. Br. 18b). Each section of the regulations notes (*e.g.*, App. Br. 31b, 37b, 40b, 40 C.F.R. 415.62, 415.72, 415.82):

> In establishing the limitations set forth in this section, EPA took into account all information it was able to collect, develop and solicit with respect to factors (such as age and size of plant, raw materials, manufacturing processes, products produced, treatment technology available, energy requirements and costs) which can affect the industry subcategorization and effluent levels established.[38]

[37] The effluent limitation for each production subcategory among the 22 constituting the Inorganic Chemicals Manufacturing Point Source Category is defined in a separate section of Part 415, 40 C.F.R.

The Administrator provided by regulation for individualized treatment of particular existing point sources by authorizing the issuer of a permit to grant, subject to his approval, limited variances from the 1977 effluent limitations upon finding that the factors applicable to the particular discharger are fundamentally different from those upon which the general effluent limitations are based.[39] The statute itself pro-

[38] See generally the Development Document (A. Exh. Vol. 5644–5646, 5593–5643, 5645, 5771–5809, 5810–5893) and the Economic Analysis (A. Exh. Vol. 5419A–5569). These lengthy and detailed documents explain how the effluent limitations were derived and the consideration given to each factor listed in Section 304(b).

[39] *E.g.*, App. Br. 31b, 37b, 40b; 40 C.F.R. 415.62; 415.72; 415.82. The variance clause recites that despite consideration of relevant technological and economic factors affecting subcategorization and effluent levels, relevant data may not "have been available and, as a result, these limitations should be adjusted for certain plants in this industry" (App. Br. 32b). A discharger may submit evidence to the state or federal permit issuer that "factors related to such discharger are fundamentally different from the factors considered in the establishment of the guidelines" (*ibid.*). Limitations which are more or less stringent than the regulations then may be established for that discharger by the permit issuer, upon finding that such fundamental differences exist, and upon approval by the Administrator. See also App. Br. 17b–18b.

Whether a discharger is "fundamentally different" is determined by reference to the Development Document which accompanies each set of regulations. In conformance with clear congressional intent one factor, however, cannot be considered for purposes of 1977 level variance application: the economic situation of the dis-

vides in Section 301(c) for variances from the 1983 limitations and not through the specification of factors.

Thus, Section 304 does not contemplate that the Administrator is simply to specify factors that may be taken into account and converted into effluent limitations only through the issuance of individual permits. The legislative history confirms this. The Conference Report emphasized that under Section 304 (b)(1)(B), which requires the Administrator to consider the cost of technology in relation to the benefits of the effluent reductions involved, the analysis cannot be made on a plant-by-plant basis. It may be made only in relation to categories and subcategories of particular industries. 1 Leg. Hist. 304. As Senator Muskie stated in his written explanation of this aspect of the Report (1 Leg. Hist. 170):

> The Conferees agreed upon this limited cost-benefit analysis in order to maintain uniformity within a class and category of point sources subject to effluent limitations, and to avoid imposing on the Administrator any requirement to consider the location of sources within a category or to ascertain water quality impact of effluent controls, or to determine the economic impact of controls on any individual plant in a single community.[40]

charger. See 39 Fed. Reg. 30073 and discussion *infra*, p. 58. Such variance provisions were upheld in *Natural Resources Defense Council, Inc.* v. *Environmental Protection Agency*, 537 F. 2d 642 (C.A. 2).

[40] In a recent decision (*Appalachian Power Co.* v. *Train*, No. 74-2096, *et al.*, decided July 16, 1976), the Fourth Circuit indicated a contrary view. Explaining the court's holding in this case (A. 253) that the Administrator's effluent limitations are "presumptively applicable to permit applications," *Appalachian Power* further states (slip op. 15): "Thus, the issuer of a permit, under § 402 may consider whether a particular applicant is to be held strictly to the confines of the agency's regulations. The burden of proof remains upon the applicant, however. Only after he has established the inappropriateness of the regulations as applied to him, for example, employing the generic factors of §§ 304, 306 *or* any specific variance clauses promulgated thereunder, need the permit issuer go beyond the regulations" (emphasis added). Insofar as the foregoing language invites reconsideration by the permit issuer of factors already considered by the Administrator in establishing effluent limitations under Section 301 for existing sources, and under Section 306 for new sources, the Fourth Circuit's analysis is inconsistent with the statute. The correct view is stated by the Second Circuit in *Natural Resources Defense Council, Inc.* v. *Environmental Protection Agency*, *supra*.

As the Second Circuit correctly held in *Natural Resources Defense Council, Inc.* v. *Environmental Protection Agency*, 537 F. 2d 642, 645-646, nothing in the Act requires that effluent limitations, by variance or otherwise, must encompass wholesale reconsideration at the permit granting stage of all the factors that were assertedly considered initially by the EPA in formulating the regulation. Such wholesale reconsideration was never the intent of Congress.

B. THE LEGISLATIVE HISTORY OF THE 1972 AMENDMENTS CONFIRMS THAT THE ADMINISTRATOR HAS AUTHORITY TO ESTABLISH EFFLUENT LIMITATIONS UNDER SECTION 301(b) FOR CLASSES AND CATEGORIES OF POINT SOURCES

Any doubt still remaining about the Administrator's authority under Section 301 to establish effluent limitations for classes and categories of point source pollution is dispelled by the legislative history of the 1972

Amendments. That history shows that Congress intended the Administrator to set effluent limitations under Section 301(b) on the basis of industrial subcategories, not on a plant-by-plant basis, and that it intended the effluent limitations to be uniform within each subcategory—a uniformity that could not be achieved if effluent limitations could be established only in permits.

There were differences in the bills passed by the House and the Senate,[41] which were resolved in conference (1 Leg. Hist. 161–279). S. Conf. Rep. No. 92–1236, 92d Cong., 2d Sess. (1972) (1 Leg Hist. 281–339). The bill was passed over the President's veto[42] (1 Leg. Hist. 95–136).

The Conference Report stated with respect to the effluent limitations to be achieved under Section 301 (1 Leg. Hist. 304):

> The conferees intend that the Administrator or the State, as the case may be, will make the determination of the economic impact of an effluent limitation on the basis of classes and categories of point sources, as distinguished from a plant by plant determination.[43]

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[41] See H.R. 11896, 92d Cong., 2d Sess. (1972) (1 Leg. Hist. 893–1110); and H.R. Rep. No. 92–911, 92d Cong., 2d Sess. (1972) (1 Leg. Hist. 753–888); S. Rep. No. 92–414, *supra* (2 Leg. Hist. 1415–1533).

[42] The President objected on budgetary grounds (1 Leg. Hist. 137).

[43] The Conference Report also contemplated that the Administrator could waive applicable 1983 effluent limitations for particular existing point sources (1 Leg. Hist. 304): "However, after July 1, 1977, the owner or operator of a plant may seek relief from

In discussing the closely related provisions of Section 304(b), governing regulations providing guidelines for effluent limitations, the report said (1 Leg. Hist. 309):

> Except as provided in section 301(c) of this Act, the intent of the Conferees is that effluent limitations applicable to individual point sources within a given category or class be as uniform as possible. The Administrator is expected to be precise in his guidelines under subsection (b) of this section, so as to assure that similar point sources with similar characteristics, regardless of their location or the nature of the water into which the discharge is made, will meet similar effluent limitations.

Senator Muskie, on presenting the Conference Report to the Senate, reiterated this purpose to require each point source within a category or class to meet nationally uniform effluent limitations (1 Leg. Hist. 162–163):

> Senators will recall from the November debate on the Senate bill that there were three essential elements to it: Uniformity, finality, and enforceability. Without these elements a new law would not constitute any improvement on the old; we would not bring a conference agreement to the floor without them.

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the requirement to achieve effluent limitations based on best available technology economically achievable. The burden will be on him to show that modified requirements will represent the maximum use of technology within his economic capability and will result in reasonable further progress toward the elimination of the discharge of pollutants. If he makes this showing, the Administrator may modify the requirements applicable to him."

> As far as uniformity and finality are concerned, the conference agreement provides that each polluter within a category or class of industrial sources will be required to achieve nationally uniform effluent limitations based on "best practicable" technology no later than July 1, 1977. This does not mean that the Administrator cannot require compliance by an earlier date; it means that these limitations must be achieved no later than July 1, 1977, that they must be uniform, and that they will be final upon the issuance of a permit under section 402 of the bill.
>
> * * * * *
>
> The third critical element that concerned the Senate in its consideration of this legislation was enforceability. Enforceability is assured through the provisions of the permit program and through section 309, the enforcement section of the act. The Administrator has the responsibility to determine the effluent limitations to be applied to each category or class of polluter, to set forth those limitations in a permit issued pursuant to section 402 of the act, and to enforce those limitations through the provisions of section 309.

The congressional intent shown in the Conference Report that uniform effluent limitations would be established also was reflected in the House and Senate treatment of the bill. In its general synopsis of the bill, the House Report characterized the relationship between Sections 301 and 402 as follows (1 Leg. Hist. 761):

> [The bill] [d]eclares to be unlawful the discharge of any pollutant by any person except as specifically authorized in the bill. The bill establishes a Federal-State discharge permit program. All permits issued under this program shall be consistent with the specific requirements of the bill, including effluent limitations or other limitations, national standards of performance, toxic and pretreatment standards, and ocean discharge guidelines.

In explaining the provision of Section 402 requiring permits to ensure compliance with "all the applicable requirements of sections 301, 302, 306, 307, 308, 316 and 403 * * *", the Report stated (1 Leg. Hist. 812–813):

> The Committee points out * * * that the term "applicable" used in section 402 has two meanings. It means that the requirement which the term "applicable" refers to must be pertinent and apply to the activity and the *requirement must be in existence by having been promulgated or implemented.*
>
> *The Committee further recognizes that the requirements under sections 301,* 302, 306, 307, 308, 316 and 403 *will not all be promulgated immediately upon enactment of this bill.* Nevertheless, it would be unreasonable to delay issuing of permits until all the implementing steps are necessary. Therefore, subsection (a)(2) provides that prior to the taking of the necessary implementing actions relating to all such requirements, the Administrator may issue permits during this interim period with such conditions as he determines are necessary to carry out the provisions of this Act. [Emphasis added.]

Similarly, in discussing the provision that compliance with a permit would be deemed compliance with various statutory requirements, the Report again reflected the expectation that effluent limitations would be promulgated under Section 301 (1 Leg. Hist. 815):

> Subsection (*l*) [now (k)] [of section 402] provides that compliance with a permit issued pursuant to section 402 shall be considered to be compliance for purposes of sections 309 and 505, with section 301, 302, 306, 307, 316 and 403 * * *. The purpose of this provision is to assure that the mere *promulgation of any effluent limitation or other limitation,* a standard, or a thermal discharge regulation, *by itself will not subject a person holding a valid permit to prosecution.* However, once such a requirement is actually made a condition of the permit, then the permittee will be held to comply with the terms thereof. [Emphasis added.]

The Senate Committee Report reflected the same view. In discussing the two-step program in Section 301(b) "for applying effluent limits," the first based on the best practicable technology "to be implemented by 1976" and the second based on the best available technology, with a goal of no discharge "to be implemented by 1981" (S. Rep. No. 92-414, *supra,* at 8, 2 Leg. Hist. 1426), the Report stated (2 Leg. Hist. 1468):

> It is the Committee's intention that *pursuant to subsection 301(b)(1)(A), and Section 304(b) the Administrator* will interpret the term "best practicable" when applied to various categories of industries as a basis for *specifying* clear and precise effluent *limitations* to be implemented by January 1, 1976. [Emphasis added.]

Senator Bentsen, a member of the Senate Public Works Committee which drafted the bill, made clear that the Administrator was to establish Section 301 limitations (2 Leg. Hist. 1283):

> In phase I, for point sources of pollutants, effluent limits shall be established not later than January 1, 1976 [now July 1, 1977], which comply with specifically defined levels of effluent control and treatment. As defined in section 301(b)(1) of the bill, and as elaborated in *the regulations which we anticipate the Administrator shall issue pursuant to section 301 and section 304,* these 1976 [now 1977] goals shall be at least * * * the "best practicable control technology currently available" for other [industrial] point sources * * *. [Emphasis added.]

When the President considered the bill, Mr. Ruckelshaus, who was the first Administrator of the Environmental Protection Agency, advised the President that "the Administration proposed that 'standards be amended to impose precise effluent requirements on all industrial sources.' The enrolled bill has done so" (1 Leg. Hist. 156).

The legislative history thus shows that Congress intended to remedy the inadequacies of previous pollution control by having the Administrator promulgate uniform national effluent standards under Section 301 (b), on the basis of subcategories of industry, and not by applying generalized guidelines to individual polluters through permits. The permit program was intended to be the method for implementing and enforc-

ing the effluent limitations already established under Section 301(b), not for establishing those limitations.[44]

Congress wisely adopted this procedure for achieving uniform national effluent standards. If effluent limitations could be imposed only through the permit program, it would be virtually impossible to produce the national uniformity in controlling pollution that Congress sought to achieve. Wide variations in permissible limits of pollution within a single subcategory of industry would result.

In the absence of uniform, binding effluent limitations, the permit issuing official would essentially start over again, engaging in largely redundant reconsideration of all the factors and information the Administrator considered in establishing the regulations. Not only would the final permits reflect the varying views of the 27 States with approved permit programs, but each such State would be forced to hold lengthy adjudicatory procedures to consider anew the effluent limitations which the Amendments require. Since each point source must achieve the best practicable control technology currently available by July 1, 1977, and the best available technology economically achievable by

[44] Petitioners challenge the authority of the foregoing legislative history, relying primarily on an article by the former General Counsel of the Environmental Protection Agency suggesting that the legislative history contains so many conflicting statements as to render it unreliable (Br. 61–63). This Court, however, has always recognized the relevance and importance of the statements in Committee Reports and by the principal sponsors of, and spokesmen for, the legislation in determining its meaning. See, *e.g.*, *Train* v. *Colorado Public Interest Research Group*, No. 74–1270, decided June 1, 1976.

July 1, 1983, Congress did not intend the Administrator and the State permit issuers to consider anew in licensing proceedings the same factors that the Administrator had already considered in promulgating the guidelines under Section 304(b) and twice to make the necessarily complex and difficult analyses required.

Under petitioners' approach, the nationally uniform control of pollution that Congress intended to accomplish in the 1972 Amendments would be frustrated. Moreover, the delays resulting from petitioners' interpretation would thwart, if not render impossible, the attainment of the deadlines which Congress established.

C. ESTABLISHMENT BY THE ADMINISTRATOR OF GENERALLY APPLICABLE EFFLUENT LIMITATIONS WOULD NOT CURTAIL OR WEAKEN THE ROLE CONGRESS INTENDED THE STATES TO HAVE IN THE ADMINISTRATION OF THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS

Petitioners contend that establishment of generally applicable effluent limitations by the Administrator is inconsistent with the congressional policy reflected in the Amendments to preserve the rights and responsibilities of the states in controlling pollution, planning land use, and regulating their water resources. Section 101(b), 33 U.S.C. (Supp. V) 1251(b). They assert that state permit-issuing authorities will be reduced to "mere scriveners" (Pet. Br. 58), if they are bound by nationally uniform minimum effluent limitations.

The Amendments, however, contain elaborate and complex provisions for the participation of the states in the processes of formulating effluent limitations and of issuing permits. These provisions are consistent with, and indeed contemplate, the establishment of basic effluent limitations by the Administrator.

Section 303 of the Amendments, 33 U.S.C. (Supp. V) 1313, requires the states to develop water quality standards for all their waters, and then to survey those waters to ascertain whether the Administrator's effluent limitations under Section 301(b) for the period beginning in 1977 are sufficiently stringent to ensure the attainment and maintenance of such quality. Section 303(d)(1)(A), 33 U.S.C. (Supp. V) 1313(d)(1)(A). If they are not, the state must establish for the particular waters involved a total maximum daily load of pollutants, which the discharges permitted under federal or state permits cannot exceed. Section 303(d)(1)(C), 33 U.S.C. (Supp. V) 1313 (d)(1)(C).

When a permit for a specific point source is under consideration, the Administrator's effluent limitations under Section 301(b) will govern the permit only if those limitations will meet the state water quality standards.[45] If not, the permit must impose "more stringent" limitations. Section 301(b)(1)(C), 33 U.S.C. (Supp. V) 1311(b)(1)(C). Thus, more stringent limitations based on state requirements may frequently supersede the federal limitations.

[45] See 1 Leg. Hist. 209 (statement of Senator Tunney), 238, 353, 488, 724 (statements of Representatives Jones, Blatnik, Wright and Robison).

Under Section 304(a) and (b), the Administrator is required to consult with the states on water quality criteria and effluent guidelines. Under Section 309 (a)(1), the Administrator may refer violations of a state-issued permit to the state before he seeks to remedy the violation. Although the Administrator has the initial responsibility to issue NPDES permits under Section 402(a), the states may assume this function under a state permit program, approved by the Administrator, which meets the standards specified in Section 402(b), including compliance with the effluent limitation provisions of the Amendments in Sections 301 (existing sources), 306 (new sources), 307 (toxic discharges), 308 (inspection, monitoring and reports) and 403 (ocean discharge criteria). Section 402(b). Conversely, the Administrator cannot issue a permit unless the state in which the permit applicant is located certifies, or refuses or fails to certify, that the permit will assure compliance with applicable provisions of Sections 301, 302, 306 and 307, state water quality requirements and any other appropriate requirement of state law, or certifies that there is no limitation or standard applicable under these provisions.[46] Section 401(a)(1), 33 U.S.C. (Supp. V) 1341(a)(1).

The 27 states operating approved programs ("NPDES states") (see p. 36, *supra*) perform the

[46] Under Section 208, states also have primary responsibility for controlling "non-point sources" of pollution (*e.g.*, run-off from open lots). Section 208(b)(2), 33 U.S.C. (Supp. V) 1288(b)(2).

same functions as the Regional Administrators of the Environmental Protection Agency, to whom the Administrator has delegated his permit-issuing authority in the remaining states. 40 C.F.R. 125.4. These 27 states have important functions in applying the Administrator's effluent limitations in the permits they issue to individual dischargers. They must "provide an opportunity for public hearing before ruling on each application." Section 402(b)(3). They must determine the subcategory in which the point source falls—a task which may involve sophisticated technological analysis, particularly when multi-process plants are involved.[47] They must also determine such variables as production rate or wastewater flow rate, in order to translate limitations expressed, for example, in pounds of pollutant per ton of production into an exact number.[48]

A particularly important state function involves application of the variance clause established by the regulations for the 1977 level of effluent limitations under Section 301 (see discussion *supra,* p. 57, n. 39). The state NPDES authority must determine whether for a particular point source there exists a "fundamentally different factor" and, if so, ascertain the ex-

[47] Quite frequently, the permit issuer will find that, while a point source is generally subject to an EPA effluent limitation, some portion of its discharge is not. The permit will, therefore, in part reflect an *ad hoc* determination of the appropriate limitations. In the case of complex sources, two or more effluent limitations may apply and determination of the permit limitations will require a weighted application of the limitations.

[48] The regulations challenged in this case are in this form. See, *e.g.*, 40 C.F.R. 415.62, 415.92, 415.152; App. Br. 33b, 46b, 54b.

tent to which the effluent limitations should be adjusted accordingly (*ibid*).[49]

The NPDES state is also responsible for determining a very important type of "effluent limitation"—the schedule of compliance.[50] A compliance schedule is a "schedule of remedial measures including an enforceable sequence of actions or operations leading to compliance with an effluent limitation, other limitation, prohibition, or standard." Section 502(17), 33 U.S.C. (Supp. V) 1362(17). The authority to set compliance schedules is critical, since the timing by which a source achieves compliance with the Administrator's effluent limitations will have important fiscal and social implications. In establishing a compliance schedule, NPDES states have the exclusive power to set interim effluent limitations which existing sources must achieve prior to the effective dates of the federal effluent limitations for 1977 and 1983. Sections 402(b)(1) and 502(17), 33 U.S.C. (Supp. V) 1342(b)(1) and 1362(17).[51]

Finally, the state permit-issuing authority also is responsible for establishing specific monitoring and

[49] On this basis alone, the District of Columbia Circuit rejected the argument that state permit granting would be a "clerical rubber stamping exercise." *American Paper Institute* v. *Train*, No. 74-1480, decided August 6, 1976, slip op. 15–16.

[50] Section 502(11), 33 U.S.C. (Supp. V) 1362(11), includes "schedules of compliance" in the definition of effluent limitations.

[51] Although Congress anticipated that establishment of effluent limitations would precede issuance of most NPDES permits, because of the short deadlines in the Amendments, federal and state permit-issuers need not delay permits until those limitations have been promulgated. See 1 Leg. Hist. 813.

reporting requirements, without which enforcement of the permit would be impossible (Section 402(b)(2)(B)).

The many ways in which states establish permit conditions, including schedules of compliance and water quality-based effluent limitations, account for the references in the Amendments and its legislative history to the "establishment" of "limitations" by states. But this power is supplementary to, not exclusive of, the Administrator's primary responsibility under Sections 301, 304, 306 and 307 to establish uniform national technology-based limitations for point sources of pollution. Section 510 declares that except as expressly provided, nothing in the Amendments shall preclude a state or political subdivision from adopting or enforcing "any standard or limitation respecting discharges of pollutants * * *." It further provides, however, that "if an effluent limitation * * * is in effect under this Act," the state and its subdivisions "may not adopt or enforce any effluent limitation * * * which is less stringent * * *." As noted above (see discussion *supra*, p. 40), this provision contemplates that minimum effluent limitations will be established by someone other than the state, *i.e.*, by the Administrator.[52]

[52] Petitioners argue (Br. 82–83) that if the Administrator has authority to establish uniform effluent limitations that bind the states in issuing permits, there would be no need for the Administrator's authority under Section 402(d) to veto the issuance of any particular state permit. That authority, however, serves the important function of enabling the Administrator to bar any state permit that does not comply with the effluent limitations he has established under Section 301(b). Although hopefully all state authorities will comply with those limitations in issuing permits, cases may arise where they fail to do so, and the Administrator then can use his veto power to insure state compliance with the effluent limitations in the particular case.

II

THE ADMINISTRATOR EMPLOYED AN APPROPRIATE PROCEDURE IN COMBINING THE PROMULGATION OF GUIDELINES UNDER SECTION 304 AND THE ESTABLISHMENT OF EFFLUENT LIMITATIONS UNDER SECTION 301 INTO A SINGLE PROCEEDING

Section 304(b) requires the Administrator to publish guidelines for effluent limitations within one year of the enactment of the statute, *i.e.*, by October 18, 1973. Section 301 requires the achievement of effluent limitations for existing point sources, based on the best practicable technology currently available, by July 1, 1977. These requirements, which apply to the whole of American industry, posed an enormous task, which the Administrator was required to accomplish within a short time.

As the record in this case shows, the kind of in-depth analysis of the sources of pollution and the best available technology for controlling it which the Amendments intended required massive study. Although the Amendments seemingly contemplate that the Administrator first would promulgate the guidelines and then convert them to effluent limitations, the short period within which he had to complete both of these actions made it impracticable to do so. Instead, he followed the preeminently practical procedure in

dealing with all industries of combining both steps into a single proceeding at the end of which he made a single determination embodying the guidelines and the effluent limitations.

The Administrator's decision to follow this procedure was a reasonable one in the circumstances. It reflects his expert judgment as to the most effective procedures for making this novel, complicated and complex statute operative in a short time. His determination was an integral part of setting the statute's "machinery in motion, of making the parts work efficiently and smoothly while they are yet untried and new," and his view that the statute authorizes this procedure is therefore entitled to substantial weight. *Udall* v. *Tallman,* 380 U.S. 1, 16.

It is hardly surprising, therefore, that the four courts of appeals that have considered this question have upheld the Administrator's action in combining into a single proceeding the establishment of the guidelines under Section 304 and the effluent limitations under Section 301. ***American Frozen Food Institute*** v. ***Train,*** C.A.D.C., No. 74–1464, *et al.,* decided May 11, 1976, slip op. 38–41; ***Hooker Chemical & Plastics Corp.*** v. ***Train,*** 537 F. 2d 620, 628–629 (C.A. 2); *American Petroleum Institute* v. *Environmental Protection Agency,* C.A. 10, No. 74–1465, *et al.,* decided August 11, 1976, slip op. 14–15, and the decision in this case (A. 260).

Petitioners can point to no prejudice they suffered

from the procedures the Administrator followed. In August 1973 the Administrator published a preliminary notice with respect to the promulgation of guidelines and effluent limitations, in which he explained the procedures and methodology he proposed to follow (*supra,* p. 16). In October 1973, he published a notice of proposed rulemaking which included specific numerical effluent limitations for each of the 22 subcategories of the inorganic chemicals manufacturing industry (*supra,* p. 16). The notice gave all interested parties the opportunity to comment on the rules and petitioners did so. The actual effluent limitations were promulgated in March 1974 (*supra,* p. 19).

Petitioners thus had full opportunity to be heard with respect to both the guidelines and the effluent limitations before the Administrator promulgated them. They would have been no better off in making their objections to the guidelines and limitations known to the Administrator if he had dealt with these subjects in two separate proceedings, and not established the effluent limitations until after the guidelines had been promulgated. The latter procedure, however, as we have indicated, would have seriously interfered with the Administrator's ability to get under way the pollution control program directed by Congress within the time limits Congress had set.

This Court last Term upheld a similar combination into a single proceeding of administrative determina-

tions which the statute seemingly contemplated would be made in separate steps. Section 7(b) of the Natural Gas Act, 52 Stat. 821, prohibits a natural-gas company from abandoning any facility without a determination by the Federal Power Commission that the public convenience and necessity permits the abandonment. In *Federal Power Commission* v. *Moss*, 424 U.S. 494, the Court upheld a Commission order which "upon a proper finding of public convenience or necessity, simultaneously authorize[d] both the sale of natural gas in interstate commerce by a producer and the abandonment of the sale at a future date certain" (*id.* at 496). The Court reasoned that "[i]n the absence of an explicit direction [in the Natural Gas Act] the inference may reasonably be made that Congress left the timing of the finding within the general discretionary power granted the FPC 'to regulate abandonment of service' * * * '[T]he Commission's broad responsibilities . . . demand a generous construction of its statutory authority' * * * and that inference is plainly consistent with Congress' regulatory goals." 424 U.S. at 500. This reasoning is equally applicable to the Administrator's combining Sections 301 and 304(b) determinations into a single proceeding.

Petitioners argue (Br. 31–36), however, that the Administrator did not comply with Section 304(b) because he did not issue formal "regulations" providing "guidelines for effluent limitations," as that section requires him to do. Although the Development Documents containing the technological data were not formally designated as "regulations," they, together

with the preamble to the formal regulations in issue and the regulations themselves which specify "the degree of effluent reduction" to be achieved (Section 304(b)(1)(A) and (b)(2)(A), in practical effect met the requirements of Section 304(b). As detailed in the statement *supra*, pp. 10–11, 13–21), the procedures the Administrator followed in promulgating the guidelines were no different from those he would have followed had he promulgated them as formal "regulations." The Administrator's actions in this case fully complied with the procedures and standards that Congress contemplated and intended for the establishment of guidelines and effluent limitations, and they are not invalid merely because he failed to attach the label "regulations" to all documents which constitute the guidelines.[53]

III

THE COURTS OF APPEALS HAVE EXCLUSIVE JURISDICTION TO REVIEW EFFLUENT LIMITATIONS PROMULGATED BY THE ADMINISTRATOR UNDER SECTION 301 OF THE AMENDMENTS, WHICH INCLUDES JURISDICTION TO REVIEW THE GUIDELINES UNDER SECTION 304, WHICH WERE PROMULGATED IN THE SAME PROCEEDING AS THE EFFLUENT LIMITATIONS

Section 509(b)(1) of the Amendments, 33 U.S.C. (Supp. V) 1369(b)(1), provides in pertinent part:

> Review of the Administrator's action * * * (E) in approving or promulgating any effluent limitation or other limitation under section 301

[53] As petitioners recognize, the effluent limitations were established by regulations. App. Br. lb; see *id.* at 2b, 20b.

> * * * may be had by any interested person in the Circuit Court of Appeals * * *.

The foregoing provision in terms covers the Administrator's promulgation of effluent limitations under Section 301. Under well-settled principles, this jurisdiction of the court of appeals is exclusive. Cf. *Whitney Bank* v. *Bank of New Orleans,* 379 U.S. 411, 420–422; *Fort Worth Nat. Corp.* v. *Federal Savings & Loan Ins. Corp.,* 469 F. 2d 47, 52 (C.A. 5); H.R. Rep. No. 2122, 81st Cong., 2d Sess. (1950).

As this Court stated in *Whitney Bank, supra,* 379 U.S. at 420:

> [W]here Congress has provided statutory review procedures designed to permit agency expertise to be brought to bear on particular problems, those procedures are to be exclusive. * * * To permit a district court to make the initial determination of a plan's propriety would substantially decrease the effectiveness of the statutory design.

Petitioners argue (Br. 87), however, that since the Administrator has no authority to establish effluent limitations under Section 301, the courts of appeals have no jurisdiction to review them. We have answered the premise of that argument in points I and II above; since, as we have shown, the Administrator has that power, his exercise of it is reviewable in the courts of appeals. Moreover, the jurisdiction of the courts of appeals to review the Administrator's effluent limitations necessarily includes the threshold determination whether he has the power to establish

them. *Citizens to Preserve Overton Park* v. *Volpe,* 401 U.S. 402, 415. Indeed, petitioners apparently recognize (Br. 85) that, if the Administrator has that authority, its exercise is reviewable in the courts of appeals and not in the district courts.

Petitioners' main contention on the jurisdictional question relates to review of the Administrator's guidelines for effluent limitations promulgated under Section 304(b). They argue that even if the Administrator has authority to promulgate effluent limitations under Section 301 (which are reviewable in the courts of appeals), the guidelines upon which those limitations are based are reviewable only in the district courts. Their argument produces the anomalous result that even though the Administrator promulgated the guidelines and limitations almost simultaneously in a single proceeding, and even though the two are inextricably intertwined since the effluent limitations are determined by applying the guidelines to particular industrial subcategories, the two sets of actions nevertheless are to be reviewed in different courts.

The Administrator formulated the guidelines and the effluent limitations in a single proceeding and promulgated both of them simultaneously as component parts of a single determination. The guidelines contained the technological information upon which the effluent limitations were based and which they incorporated; they were an integral part and an essential element of the effluent limitations. They were basi-

cally a preliminary but indispensable step in the Administrator's ultimate establishment of the effluent limitations.

In these circumstances, the guidelines are reviewable together with the effluent limitations only in the courts of appeals, and not in the district courts. This conclusion follows from the language of the statute and the seriously adverse consequences upon its proper administration that would result from the bifurcated review that petitioners propose.

Section 509(b)(1) provides for review of "the Administrator's action * * * in promulgating any effluent limitation." As the court of appeals held (A. 250), one of the Administrator's actions in establishing the effluent limitations for the inorganic chemicals manufacturing industry was the issuance of the guidelines upon which those limitations were based. Those guidelines, it reasoned, are "the key to the attainment of the objectives set forth in § 301" (*ibid.*). They are therefore exclusively reviewable in the courts of appeals under Section 509(b)(1).

The divided review that petitioners espouse would thwart the congressional intent that reduction and then elimination of pollution of the Nation's waters be accomplished as soon as possible. The first and basic step in meeting this objective is, as we have explained above, the establishment on a national uniform basis of (1) guidelines under Section 304 for effluent limitations and (2) specific numerical effluent limitations based upon those guidelines. The limitations, in turn, would be the basis for the specific reductions (specified in permits) that individual polluters are required to make in their effluent discharges by 1977 and 1983. If the national standards are to accomplish their purpose, they must be final and effective as soon as possible. See *Natural Resources Defense Council, Inc.* v. *Train*, 510 F. 2d 692, 704–705 (C.A.D.C.).

Congress sought to accomplish the latter objective by requiring in Section 509(b)(1) that any petition to review the Administrator's action in approving or promulgating any effluent limitation must be filed within 90 days, unless based solely on grounds occurring after the ninetieth day.[54] The Amendments further provide that actions of the Administrator so reviewable are not reviewable in any civil or criminal enforcement proceeding (Section 509(b)(2)). As the Senate Committee Report on the bill explained: "In order to maintain the integrity of the time sequences provided throughout the Act, * * * any review sought must be filed within 30 [now 90] days of the date of the challenged promulation * * *" (2 Leg. Hist. 1503). See also, *American Meat Institute* v. *Environmental Protection Agency, supra*, 526 F.2d at 452.[55]

[54] This 90-day limitation covers not only effluent limitations for existing sources of pollution established under Section 301, but also those for new sources established under Section 306, for toxic pollutants and for users of municipally owned treatment works established under Section 307, and for permits incorporating those limitations issued under Section 402.

[55] In this proceeding the Administrator promulgated guidelines for effluent limitations to be achieved by both 1977 and 1983. Petitioners argue (Br. 80–82) that Congress did not intend

Petitioners' proposal for bifurcated review would upset the carefully drawn system of judicial review that Congress provided in order to insure prompt determination of the validity of the Administrator's actions in setting national standards for effluent limitations. Unlike the 90-day limit upon court of appeals' review, there is no time limit for suits in the district courts. Permitting review of the guidelines initially in the district courts, followed by court of appeals' review of those decisions, would delay the effectiveness of the national standards. Furthermore, uniform standards could be achieved more effectively and more expeditiously by direct review in the 11 courts of appeals than by initial review in the 94 district courts. Petitioners' theory would produce the anomalous situation that, although the effluent limitations and the permits applying them would be reviewed in the courts of appeals, the underlying guidelines upon which those limitations rest would be reviewed initially in the district courts. As the court of appeals pointed out in this

the latter guidelines to be reviewed at this time, and that the 90-day limitation on court of appeals' review thus shows that those courts were not to review the guidelines.

There is nothing in the language of the Act, its design or its legislative history that indicates that Congress intended to defer review of the guidelines for 1983 to some future date. To the contrary, since the Administrator promulgated the guidelines for both periods simultaneously, any review of them also should be had simultaneously. Moreover, the arguments against permitting the delay in implementing the Administrator's limitations on effluent discharges that petitioners' bifurcated review would create are equally applicable to the 1983 standards as to those for 1977. Indeed, in selecting the methods by which they will achieve the latter restrictions, dischargers also will have to consider the former.

case (A. 249), under petitioners' theory an operator of a single plant would be required to institute two separate but concurrent actions—one in the district court and one in the court of appeals—to challenge the Administrator's simultaneous actions under Sections 301, 304 and 306 affecting the plant (A. 250). Congress did not intend the judicial review provisions of the 1972 Amendments to produce such delaying and cumbersome results.[56]

In view of these considerations, it is not surprising that all but one of the seven circuits that have reviewed challenges to the Administrator's guidelines and effluent limitations have held that they have jurisdiction to review those regulations.[57] Indeed, in every case in which the district court dismissed a suit challenging those regulations for lack of jurisdiction, the plaintiff

[56] The Administrative Conference of the United States has recommended direct review in the courts of appeals of agency rules "whenever (i) an initial district court decision respecting the validity of a rule will ordinarily be appealed or (ii) the public interest requires prompt, authoritative determination of the validity of the rule." Administrative Conference of the United States, Recommendation No. 75-3 (adopted June 5-6, 1975) 1974-75 Report, Administrative Conference of the United States, March 1976, pp. 42-46. Both conditions apply here. See also Currie and Goodman, *Judicial Review of Federal Administrative Action: Quest for the Optimum Forum*, 75 Col. L. Rev. 1 (1975); Jaffe, *Judicial Control of Administrative Action* 158-159 (1965); Note, *Jurisdiction to Review Federal Administrative Action: District Court or Court of Appeals*, 88 Harv. L. Rev. 980, 984-985 (1975).

[57] In addition to the instant case, see *American Frozen Food Institute* v. *Train*, C.A. D.C., Nos. 74-1464, *et al.*, decided May 11, 1976; *Hooker Chemicals & Plastics Corp.* v. *Train*, 537 F. 2d 620 (C.A. 2) *American Iron & Steel Institute* v. *Environmen-*

also had filed a petition to review in the court of appeals, [58] as petitioners did here.[59]

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tal Protection Agency, 526 F. 2d 1027 (C.A. 3); *American Meat Institute* v. *Environmental Protection Agency*, 526 F. 2d 442 (C.A. 7); *American Petroleum Institute* v. *Train*. 526 F. 2d 1343 (C.A. 10). *Contra: CPC International Inc.* v. *Train*, 515 F. 2d 1032 (C.A. 8).

[58] In addition to the present case see: *American Paper Institute* v. *Train*, 381 F. Supp. 553 (D.D.C.) (pulp and paper regulations), petition for review, C.A. D.C., Nos. 74–1480, *et al.*, decided August 6, 1976; *American Petroleum Institute* v. *Train*, 7 E.R.C. 1795 (D. Colo.) (petroleum refining regulations), petition for review decided August 11, 1976, C.A. 10, No. 74–1465; *The Anaconda Co.* v. *Environmental Protection Agency*, D. Mont., No. CV 75–69–BU (unreported) (appeal pending, C.A. 9, No. 76–1603) (nonferrous metals regulations), petition for review, C.A. 9, No. 75–2170, transferred, C.A. 10, No. 75–1605; *Homestake Mining Co.* v. *Train*, D. S.D., No. CIV 76–5011 (ore mining and dressing regulations), petition for review, C.A. 10, Nos. 76–1287, 76–1242; *Shell Oil Co.* v. *Train*, 415 F. Supp. 70 (W.D. Cal.) (petroleum refining regulations), appeal pending, C.A. 9, No. 76–1870, petition for review dismissed, C.A. 9, No. 75–2070 because regulations under review in Tenth Circuit.

Seven district court actions remain pending. In four of them, petitions for review are also pending in the courts of appeals. *Laupahoehoe Sugar Co.* v. *Train*, D. Hawaii, No. 75–0159, petition for review of the sugar processing regulations pending in the Ninth Circuit, No. 75–2252; *Sierra Club* v. *Train*, D. D.C., No. 76–1026, petition for review of the iron and steel Phase II regulations pending in the Third Circuit, No. 76–1749; *International Paper Co.* v. *Train*, E.D. Ark., No. BP–76–C–212, petitions for review pending, C.A. D.C., Nos. 76–1689, 76–1676. The remaining four all arose in the Eighth Circuit. Two of them involve, in part, challenges to a regulation which the Seventh Circuit sustained in *American Meat Institute* v. *Environmental Protection Agency*, 526 F. 2d 442; *American Association of Meat Processors* v. *Train*, D. Neb., No. 75–0–394; and *N.I.M.P.A.* v. *Train*, D. Neb., No. 75–0–369. One of the two remaining actions is pending in the district court and the other is on appeal to the Eighth Circuit. *National Renderers Ass'n* v. *Train*, D. Neb., No. 75–0–

([59] Footnote 59 is on p. 85 of this brief.)

CONCLUSION

For the foregoing reasons, the judgment of the court of appeals should be affirmed, in part, except in the

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482), *Grain Processing Corp.* v. *Train*, 407 F. Supp. 96 (S.D. Iowa), appeal pending, C.A. 8, No. 76–1233.

Although a decision by this Court that the district courts have no jurisdiction to entertain those suits would deny the plaintiffs in those four cases judicial review of their claims, that does not mean that they have no chance of obtaining redress if the regulations should prove to be unduly harsh in operation. They may request the agency to modify its regulations, and if it declines to do so, may seek timely court of appeals' review of such refusal under Section 509(b). See *Oljato Chapter of the Navajo Tribe* v. *Train*, 515 F. 2d 654, 666–667 (C.A.D.C.); *Kesinger* v. *Universal Airlines, Inc.*, 474 F. 2d 1127, 1132 (C.A. 6).

[59] Petitioners contend (Br. 94–96) that if this Court holds that the courts of appeals have no jurisdiction to review the Administrator's establishment of effluent limitations under Section 301 (b), it nevertheless should allow to stand the court of appeals' action in this case in setting aside parts of those limitations. (Except for the one issue involved in the government's petition in No. 75–1705, the government has not sought review of those modifications.) The argument rests upon the court of appeals' admitted jurisdiction under Section 509(b)(1)(A), 33 U.S.C. (Supp. V) 1369(b)(1)(A), to review effluent limitations for new sources, which the statute terms "standards of performance." Petitioners invoked that jurisdiction in their petition to review in this case, which challenged the Administrator's effluent limitations for both new and existing sources. They note that both sets of limitations, as well as the guidelines for existing sources, are based upon the same record made in a single proceeding and that the validity of all three involves interrelated factual and legal issues. They conclude that the court of appeals' modifications of the effluent limitations under Section 301 can be upheld as a proper exercise of its pendent jurisdiction exercised in connection with its review of new source effluent limitations established under Section 306, under such cases as *Cheng Fan Kwok* v. *Immigration and Naturalization Service*, 392 U.S. 206, 216, n. 16, and *Romero*

respect in which the Administrator is challenging that judgment in No. 75–1705.

Respectfully submitted.

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v. *International Terminal Co.*, 358 U.S. 354, 380–381. Cf. also *Foti* v. *Immigration and Naturalization Service*, 375 U.S. 216, 226–227.

As noted, the government has not challenged those rulings of the court of appeals here. Moreover, it is important to the proper administration of the statute that there be a definitive determination of the validity of the effluent limitations in this industry as soon as possible. In the circumstances, we agree that it would be inappropriate to vacate the judgment of the court of appeals insofar as it made those modifications in the effluent limitations and remand the case to the district court to consider those issues. Not only would such a remand cause delay, but it would be a waste of time, since the district court undoubtedly would follow the vacated ruling of the court of appeals, to which any appeal from its decision would lie.

U.S. GOVERNMENT PRINTING OFFICE: 1976

In the Supreme Court of the United States

OCTOBER TERM, 1976

No. 75-978

E. I. DU PONT DE NEMOURS AND COMPANY, et al.,

Petitioners,

v.

RUSSELL E. TRAIN, as Administrator,
Environmental Protection Agency, et al.,

Respondents.

On Writ Of Certiorari To The United States Court Of Appeals For The Fourth Circuit

REPLY BRIEF FOR PETITIONERS

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NOVEMBER 26, 1976

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No. 75-978

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On Writ Of Certiorari To The United States Court Of Appeals For The Fourth Circuit

REPLY BRIEF FOR PETITIONERS

The implication running throughout respondents' ("EPA's") brief in this case is that Congress through a "legislative oversight" simply omitted to specify in the statute that EPA was to promulgate effluent limitations by regulation for the existing industrial plants in this nation.[1] EPA's arguments by indirection ask this Court in effect to supply the provisions which purportedly were inadvertently or erroneously omitted.

[1] At one point in its brief EPA said—"Although Section 301 does not explicitly provide that it is the Administrator who is to establish the effluent limitations, that is its clear and necessary implication." (EPA's Brief in No. 75-978 ("EPA's Br."), at 36-37.) Otherwise, EPA's brief largely skirts the specific source for its asserted power to issue effluent limitations directly by regulation for existing plants.

It was a student commentator who used the phrase "legislative oversight" in addressing Congress's failure to provide that effluent limitations be issued by the Administrator through the mechanism of regulations. Casenote, IV *Fordham Urban Law Journal*, 623, 631 (1976).

There is no gap or lacuna in the Act. This is therefore not a situation where interim agency action is required to cure an unintended legislative omission, pending dispositive action by Congress. Instead, EPA's present arguments in support of a statutory power to set effluent limitations directly by regulation for existing plants stem from its own general policy preferences. Because EPA fears that States may be "lax" in applying the Act (App. 193, R. 6501), the Agency prefers not to accord meaningful powers to States to prescribe effluent limitations as Congress contemplated. To give effect to its preferences, EPA has claimed the power to set binding across-the-board effluent limitations, notwithstanding the fact that EPA's preferences have no statutory support.

EPA's bare assertions should not govern this Court's decision in the present case, especially since Congress did not accept the policy underlying those assertions. This Court has rejected similar efforts by agencies to rewrite statutes, efforts premised on policy goals not accepted by Congress and not written into legislation. This Court said of one such effort by the Interstate Commerce Commission: "Neither the Court nor the Commission is warranted in departing from those [statutory] standards because of any doubts which may exist as to the wisdom of following the course which Congress has chosen." *United States* v. *Carolina Carriers Corp.*, 315 U.S. 475, 489 (1942). Cf. *Union Electric Co.* v. *Environmental Protection Agency*, ——U.S.——, 44 U.S.L.W. 5060, 5064-5065 (June 25, 1976).

The Federal Water Pollution Control Act as written by Congress places substantial authority in States with EPA-approved permit programs. These States are obliged to set discharge permits for particular plants, and in these permits the States are to apply the "guideline" regulations which Section 304(b) of the Act explicitly requires EPA to issue. The particular allocation of responsibility between the States and the Federal EPA currently reflected in the Act is a creation of Congress, reached after considering the statutory objectives in light of principles of federalism. It should be given a chance to work. Unless and until Congress acts to revise its handiwork, EPA should be directed to follow "the course which Congress has chosen." (*Id.*)

I.

EPA's CURRENTLY ASSERTED POSITION CONSTITUTES AN UNWARRANTED *VOLTE FACE* FROM ITS ORIGINAL AND CONTEMPORANEOUS CONSTRUCTION OF THE ACT

EPA strenuously argues that its construction of the Act is "reasonable" and therefore that "the Court should uphold it" without a great deal of questioning. (EPA's Brief at 34-35.) Petitioners' arguments based upon the statutory language are dismissed as "hypertechnical or insignificant distinctions in the wording" of the Act. (*Id.* at 26.)

EPA also claims that the Administrator made known shortly after the enactment of the 1972 Amendments that it would "establish both guidelines under Section 304(b) and effluent limitations under Section 301(b)." (*Id.* at 35 n.25.) EPA uses this factual claim as a basis for the argument that its present interpretation of the Act was adopted contemporaneously with the enactment of the 1972 Amendments, that it has been consistently followed thereafter, and that its interpretation thus is entitled to be accorded some weight. (*Id.*)

Petitioners contest EPA's factual claims; petitioners also controvert EPA's arguments based on those claims.[2] Fortunately, the full administrative record is before the Court,[3]

[2] In a confusing footnote EPA cites the regulations reprinted in the Appendix to petitioners' brief (not the brief itself) as support for an assertion that petitioners "recognize [that] the effluent limitations were established by regulations." (EPA's Br. at 77, n.53.) Petitioners certainly "recognize" that EPA has *asserted* that it has implied authority under Section 301 to issue effluent limitations by regulations and that EPA *argues* it has exercised that implied authority. Petitioners' "recognition" ends there.

[3] A complete copy of the administrative record is on file with the Clerk of this Court. See Pet. Br. at 1 n.2.

and thus this factual dispute may be resolved with confidence.

The record shows the following sequence of events:

Before the enactment of the 1972 Amendments in mid-October 1972, EPA had developed what it called "guidance" documents for use with the Refuse Act Permit Program. EPA makes no mention of these documents. (Compare Pet. Br. at 14-15.) Respecting the inorganic chemicals industry, both the contractor's July 1971 report (R. 3183-3325, especially R. 3310-3314, 3316) and the October 1972 EPA guidance document (App. 8-20, R. 2550-2567) set out the guidance as ranges of effluent values.[4] EPA also contemplated that factors to guide the selection of a value from the range for a particular plant would be supplied via an EPA technical briefing. (App. 8-9, R. 2551.) The value selected would become part of the particular plant's permit. (R. 2552.) In short, the guidance documents looked like guideline regulations to be issued under Section 304(b). They were not bare single-number limitations binding upon all relevant plants.

EPA looks to the request for proposals issued by EPA on October 31, 1972, to obtain a contractor to study the inorganic chemicals industry, and claims that this request shows the Agency to have contemplated even at that early date that it would issue limitations by regulation in addition to guideline regulations. (EPA's Br. at 14-15, 35 n.25.) This claim does not withstand an examination of the record.

EPA's overall request for proposal is set out in the record at R. 6016-6281. EPA's own conception of its responsibili-

[4] In these guidance documents, EPA occasionally referred to the actual range of numerical values set out for each pollutant parameter as "limitations". See, *e.g.*, R. 2562, where EPA said, "The effluent guidelines are based on process wastewater . . ." in referring to the entire guidance document, and at the same time said, "The effluent limitations shown in Attachments A and B are average values . . ." in referring to the range of numbers for the particular parameters making up the guidelines.

ties in October of 1972 is set out at R. 6026. EPA then spoke only of issuing regulations in the form of guidelines for existing plants under Section 304(b) and standards for new sources under Section 306:

"DESCRIPTION OF THE REQUIREMENT

"A. *Introduction*

"The Federal Water Pollution Control Act Amendments of 1972 (the "Act") requires the United States Environmental Protection Agency to establish effluent limitations which must be achieved by point sources of discharges into the navigable waters of the United States. *Section 301 of the Act requires the achievement by July 1, 1977, of effluent limitations* which require the application of the 'best practicable control technology currently available,' and the achievement by July 1, 1983, of effluent limitations which require the application of the 'best available technology economically achievable.'

"Within one year of enactment, *the Administrator is required by Section 304(b) to promulgate regulations providing guidelines for the effluent limitations required to be achieved under Section 301 of the Act.* These regulations are to identify in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of the best practicable control technology currently available and best available technology economically achievable. *The regulations must also specify factors to be taken into account* in identifying the two statutory technology levels and *in determining the control measures and practices which are to be applicable to point sources* within given industrial categories or classes to which the effluent limitations apply.

(R. 6026 (emphasis added).)

Notably, EPA then viewed Section 301 as setting the overall objective to be "achieved" by existing plants. It stated that the regulations it was to issue were "guideline"

regulations under Section 304(b).[5] These guideline regulations were to contain factors "to be taken into account" in making determinations respecting the application of "technology levels" to "point sources", *i.e.*, to individual plants. (*Id.*) The resulting effluent limitations for the plant were those "required to be achieved under Section 301 . . . ." (*Id.*)

Petitioners accept the interpretation of the Act adopted by EPA at that time and argue in support of it here.

EPA cites two segments of the request for proposal as evidence of an intent on its part to promulgate effluent limitation regulations under Section 301. (See EPA's Br. at 15 & n.15, citing R. 6027, 6034.) These segments speak of effluent limitations in terms of a "range of parameters" to be "presented by the contractor." (R. 6034.)[6] The seg-

[5] The request for proposal also stated—"The Act requires the guidelines . . . to be developed within very strict deadlines. . . ." (*Id.*) The only "deadlines" for guideline regulations are contained in Section 304(b). Section 301(b) fixes the dates when the broad technological objectives are to be achieved but contains no "deadlines" for regulations.

[6] The cited portion of EPA's request is as follows:

> "Item IV. *Outline of Level I, II and III Control and Treatment Technology*
>
> . . .
>
> "EPA will of course exercise its independent judgment in determining what levels of technology satisfy these statutory terms for each industry for which *effluent limitations guidelines* and standards of performance for new sources *are to be promulgated*. . . . Therefore, the following description of Level I, II and III technology is merely a suggested outline to be used by contractors in responding to Appendices A and B of Part II of this RFP which requires the final report to set forth suggested effluent limitations and standards of performance.
>
> "The end result of the analysis undertaken by contractors will be the suggestion of effluent limitations associated with the technology identified by the contractor as Level I, II and III technology. In many, if not most instances, this assessment of Levels I, II and III technology will vary slightly depending upon such factors as the age and size of given plants within the industry and the type of production process employed. *The minimum factors which must be taken into account in establishing Levels I, II and III technology for each industrial category, and in ultimately applying such levels to individual plants within the category in issued permits, are included in the outline below.* [See *infra*, n.7.] Other factors may also be pertinent and should be identified by the contractor where appropriate. Since a range of technology will satisfy the requirements of Levels I, II and III in some instances, effluent limitations consistent with the application of such technology will also vary. *Consequently a range of parameters may be presented by the contractor.* Effluent limitations and standards of preformance [sic] shall specify the quantity of pollutants which may be contained in the effluent discharge. This quantity shall be related either to a unit quantity of product produced or raw material used in the production process, whichever shall most clearly determine the maximum degree of pollution reduction. If the contractor finds that expressing effluent limitations and standards of performance in such terms is not possible, he shall indicate an alternative method of expression and explain why such an alternative is necessary."
>
> (R. 6034-6035 (emphasis added).)

ments also state that certain "minimum factors" (which were specified in the request)[7] "should be identified" by contractors for use "in ultimately applying such levels to individual plants within the category in issued permits . . . ." (*Id.*) EPA's directions to its prospective technical contractors thus did not contemplate issuance of limitation regulations under Section 301; that section is nowhere associated with regulations. And where the Agency spoke in terms of limitations it was using the term in the sense of numbers for pollutant parameters which, along with the concurrently specified factors, were to make up the guideline regulations issued under Section 304(b). (See also *supra*, at 4 n.4.) These guideline regulations would form the basis for values fixed in permits. (R. 6034.)

The contract actually issued by EPA to General Technologies Corp. ("General Technologies") is equally as instructive respecting EPA's contemporaneous construction of the Act. In the contract EPA required General Technologies "to propose suggested draft effluent limitations guidelines" which reflected ranges and specified factors. (R. 6399.) Permits for individual plants could then be issued which could "require compliance with slightly different effluent limitations depending upon the presence of one or more of the factors specified." (*Id.*) Again, the

[7] EPA's request lists the factors identified in Sections 304(b)(1)(B) and 304(b)(2)(B). (R. 6035.)

Agency used the words "effluent limitation", but as adjectives in the phrase "effluent limitation parameters" in describing the numbers which appear in the guidelines or, alternatively, as a descriptive term for the numerical effluent conditions in a particular permit selected as a result of the application of the factors. (*Id.*)[8]

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[8] The relevant text of the contract is as follows:

"SUGGESTED EFFLUENT LIMITATIONS GUIDELINES—FORMAT

"Once the range of technology is established for each industrial category, then a determination must be made as to what constitutes Level I and Level II control and treatment technology as outlined under Item IV of the Scope of Work. *In addition, factors* similar to those used in assessing what constitutes Level I and Level II *must be specified which should be taken into account in applying the effluent limitation parameters* associated with each of these levels of technology. *Permits* issued to individual plants within the industrial category *may then require compliance with slightly different effluent limitations depending upon the presence of one or more of the factors specified.* The contractor is to propose suggested draft effluent limitations guidelines incorporating this analysis and utilizing the suggested outline of technology Levels I and II set forth under Item IV of the Scope of Work."

(R. 6399 (emphasis added).)

The contract then went on to require that the "suggested effluent limitation guidelines" contain effluent limitations parameters and the list of factors:

"*The suggested effluent limitation guidelines* for each industrial category *must contain* the following:

"A. An identification of the industrial categories and subcategories covered.

"B. Effluent limitations required for each such category.

"1. An identification of Level I and II control and treatment technologies.

"2. For each technology level identified, *a statement of the permissible amounts of discharge* constituents expressed in terms of (i) unit quantities per unit of either material used in the industrial process or units of products resulting from that process, or (ii) concentrations, whichever shall most clearly determine the maximum degree of pollution reduction.

"3. *List the factors* which should be taken into account in determining Level I and II control and treatment technology for particular plants and consequently in determining permissible effluent levels for such plants."

(*Id.* (emphasis added).)

The contract also contained an attachment setting out a "Notice" which EPA required General Technologies to include as a preface to its report. (R. 6424.) The report resulting from the contract was to be distributed to the public, and EPA wanted no doubts to arise respecting its purpose or its standing. The notice again emphatically states that EPA was looking toward guideline regulations to be issued under Section 304(b), and not issuance of limitations directly by regulation under Section 301:

"*The regulations to be published by EPA under Sections 304(b)* and 306 of the Federal Water Pollution Control Act, as amended, will be based to a large extent on the report and the comments received on it. However, *pursuant to Sections 304(b)* and 306 of the Act, EPA will also consider additional pertinent technical and economic information which is developed in the course of review of this report by the public and within EPA. . . . [P]rior to final promulgation of regulations, an EPA report will be issued setting forth EPA's conclusions concerning the subject industry, *effluent limitations guidelines* and standards of performance applicable to such industry. Judgments necessary to promulgation of *regulations under Sections 304(b)* and 306 of the Act, of course, remain the responsibility of EPA."

(R. 6424 (emphasis added).)

The EPA contract with General Technologies was effective January 9, 1973, and actually signed on May 21, 1973. (R. 6378.) Pending completion of the contract and consequent proposal and promulgation by the Agency of the guideline regulations, EPA had to provide assistance to its Regional Offices which were struggling with discharge permit applications. That assistance took the form of a Memorandum to All Regional Permit Program Directors from the Office of Permit Programs, Washington, D. C., dated May 1, 1973. A copy of this memorandum is on file in the Library of this Court. The memorandum instructed EPA's regions to use the "effluent guidance documents" for "the issuance of permits under Section 402" on an interim basis "until effluent guidelines are promulgated under Section 304." (*Id.* at 1.) The "guidance package" attached

to the memorandum spoke of limitations only in the context of the numerical values set for each of the relevant pollutant parameters in a given plant's permit. (*Id.*, attached "interim effluent guidance" at 5.)

Subsequently, EPA's "Advance Notice of Public Review Procedures" issued in August 1973 (38 *Fed. Reg.* 21202, App. 21, R. 4330), referred only to guideline regulations to be issued under Section 304(b); it did *not* refer in any respect to limitation regulations under Section 301. (Compare Pet. Br. at 15-16 with EPA's Br. at 16.) References to Section 301 were to the fact that it required plants to achieve the statutory technological objective by a specified date.

The same interpretation was expressed by EPA in its October 1973 notice of proposed rulemaking respecting the particular regulations at issue in these cases. (38 *Fed. Reg.* 28174, App. 61-62, R. 4861-4862.) EPA did not express a contrary view until Assistant Administrator Kirk wrote his letter of January 15, 1974, supporting "nationally uniform standards" because he feared States would be too "lax" in applying the guideline regulations. (App. 193, R. 6501.) Even then, Assistant Administrator Kirk tried to fit such "nationally uniform standards" into the framework of guideline regulations. (App. 192-193, R. 6501.) The final break with EPA's contemporaneous construction of these key sections did not come until Assistant Administrator Kirk's February 1974 memorandum, when he finally claimed that the EPA regulations for existing plants were also limitations being issued under Section 301. (See Pet. Br. at 20.)

EPA seeks to avoid the thrust of this history, detailed on the record in these cases, by offering a redefinition of the "phrase 'effluent limitations guidelines' to encompass [EPA's] combination of action under Section 301(b) and Section 304(b) into a single proceeding." (EPA's Br. at 16 n.16.) EPA's effort at redefinition will not square with its own regulations; it only demonstrates the weakness of the Agency's position. The general definitions in EPA's

regulations, applicable to all industry-category guidelines and new source standards, explicitly define "effluent limitations guidelines", a term not used in the Act, as regulations issued *pursuant only to Section 304(b)*, not Section 301:

> "(j) The term 'effluent limitations guidelines' means any effluent limitations guidelines issued by the Administrator pursuant to Section 304(b) of the Act." [9]

(40 C.F.R. § 401.11(j), Pet. Br. Appendix C, at 5c.) See also Pet. Br. at 19-20.

The record in these cases thus demonstrates the "about face" from the Agency's original, contemporaneous interpretation of the Act. EPA's present interpretation is entitled to no judicial deference whatsoever. *Fribourg Navigation Co.* v. *Commissioner*, 383 U.S. 272, 279-280 (1966); *cf. Train* v. *Colorado Public Interest Research Group, Inc.*, ——U.S.——, 44 U.S.L.W. 4717, 4719 n.8 (June 1, 1976). And because of the circumstances, no reliance by private parties or by the Government has arisen to entrench a construction of the statute which "ought not now to be disturbed." *Stuart* v. *Laird*, 1 Cranch [5 U.S.] 299, 309 (1803).[10]

Indeed, some branches of EPA still have not adapted to the new interpretation of the statute proffered by the Agency. In June of this year, after this Court had granted *certiorari* in the present case, EPA published a small book of questions and answers respecting the Act. The first two questions and answers were as follows:

[9] Section 401.10 sets forth the scope and purpose of these General Provisions—

> "This Part 401 sets forth the legal authority . . . which will apply to all regulations issued concerning specific classes and categories of point sources under Parts 402 through 699 of this subchapter which follow." (*Id.* at 3c.)

Part 415 of the subchapter contains the regulations for the inorganic chemical category.

[10] The doctrine of according deference to an agency's contemporaneous construction of a statute is a refinement and offshoot of the early recognition of the importance of reliance as a legitimate consideration in statutory interpretation.

"What is an effluent limitation guideline?

"An effluent limitation guideline sets forth the *degree of reduction* of a pollutant that is *attainable through the application of various levels of technology.* The guidelines are developed by EPA based on the total body of known information on effluents from a particular industry.

"What is an effluent limitation?

"An effluent limitation is a *restriction* on the amount of a pollutant that may be released from a point source into a body of water. These limitations, based on EPA's effluent limitations guidelines, are spelled out in the discharge permits each industry must obtain in order to discharge pollutants into the Nation's waterways."

(Environmental Protection Agency, *No Small Task—Establishing National Effluent Limitations Guidelines and Standards,* at 2 (June 1976) (emphasis in the original.) [11]

The foregoing quotation reflects EPA's original interpretation of the statute, and not the interpretation presented in the court of appeals and now in this Court. Petitioners urge this Court to adopt EPA's original interpretation as constituting a faithful adherence to the mandate of the Act.

II.

PUBLISHING A "DEVELOPMENT DOCUMENT" ALONG WITH AN "ECONOMIC ANALYSIS" DOES NOT SATISFY THE MANDATE OF SECTION 304(b) THAT GUIDELINE REGULATIONS BE ISSUED

EPA never really comes to grips with Section 304(b). Section 304(b) expressly provides that "the Administrator shall . . . publish . . . regulations, providing guidelines for effluent limitations . . . ." The section further provides that these regulations shall "identify . . . [the] effluent reduction

[11] Copies of this EPA publication are on file with the Librarian of this Court.

attainable through the application of best practicable control technology currently available for classes and categories of point sources . . ." (§ 304(b)(1)(A)), and shall "specify factors to be taken into account in determining the control measures to be applicable point sources . . . within such categories or classes." (§ 304(b)(1)(B).) The section goes on to list in detail the factors to be specified. The guideline regulations are given purpose by Section 301(b) which speaks of determining effluent limitations "in accordance with regulations issued by the Administrator pursuant to Section 304(b)(2) of this Act." (§ 301(b)(2)(A), see also § 301(b)(1)(A).)

EPA has now at least acknowledged the statutory command that regulations be issued under Section 304(b). (EPA's Br. at 13, 48-59, and especially 55.) But in the Agency's view, these regulations take on a strange form and have no practical purpose. EPA claims that the Development Document and the Economic Analysis,[12] while not "formally designated" as regulations, "in practical effect" meet the requirements of Section 304(b). (EPA's Br. at 76-77; see also *id.* at 10, 21, and 26.)

The Exhibit Volume of the Appendix is made up solely and entirely of EPA's Development Document and its Economic Analysis for the segments of the inorganic chemicals industry covered by the EPA regulations at issue here. There are 519 pages of rambling verbiage in the two items. These must be the strangest "regulations" any Federal agency has ever issued. They are not codified in the Code of Federal Regulations. They have no continuing purpose or legal effect. At this juncture, copies of the documents are not readily available, even from EPA itself. EPA's brief discusses these "regulations" only to explain them away. The arguments by EPA underline the Agency's efforts to render Section 304(b) a dead letter, a statutory anachronism. (See EPA's Br. at 13, 48-59, 76-77.)

[12] In EPA's view, the guideline regulations apparently may include in addition to these documents "the preamble to the formal regulations in issue and the regulations themselves." (EPA's Br. at 77; see also *id.* at 21.)

There is nothing "compelling" about an interpretation that would elide an entire section from the Act. (Compare EPA's Br. at 46.) By referring to Section 304(b), petitioners are not putting forward "a series of hypertechnical arguments that focus on minor distinctions in the wording of various sections of the Act . . . ." (*Id.*) And particularly, petitioners are not contending that any requirements be "read into the Amendments." (*Id.* at 54.) To the contrary, petitioners argue only that explicit requirements in the statutory words not be overriden and eliminated by EPA's implications. EPA would have this Court rewrite the statute to eliminate the mandate for guidline regulations in Section 304(b) and to put in its stead through implication a new permissive authorization for limitations by regulation under Section 301.

EPA asserts that its implied authority under Section 301 allows it to look at the provisions of 304(b), to select certain of the requirements set out in that section, and to deal with these selected requirements in its own way in regulations purportedly issued under Section 301. For example, petitioners have pointed out that Section 304(b) explicitly requires guideline regulations to

> "specify factors to be taken into account in determining the control measures and practices to be applicable *to point sources . . . within such categories or classes.*"
>
> (§ 304(b)(1)(B) (emphasis added).)

(See Pet. Br. at 63-73.) Notwithstanding this statutory language, ERA argues that guideline regulations under Section 304(b) were not intended for use by permit authorities because no analysis of the factors is to be made in the permit process to apply the factors to a particular plant's situation. (EPA's Br. at 58-59.) Despite the fact that Section 304(b) directs EPA to specify the factors in regulations, EPA says it "considered" the factors in establishing subcategories and that ends the matter. (*Id.* at 58.) To go any further, the Agency says, would be to "encompass wholesale reconsideration at the permit granting stage of all the factors." (*Id.* at 59.) The discussion which fol-

lows demonstrates that EPA is trying to discredit the statutory plan to achieve its goal of binding limitations issued by regulation.

The subcategories adopted by EPA for the inorganic chemicals industry reflect only differences in product types, and in a very few cases, processes.[13] Section 304(b)(1)(B) also lists as factors, to be specified in regulations,

> "the age of equipment and facilities involved, . . . the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate. . . ."[14]

None of these factors is reflected in EPA's subcategories. And it is no answer to say that the Agency considered the possible application of these other factors and rejected them. As the court of appeals noted in *du Pont II*, "[s]ome of the specified factors are of practical applicability only to individual plants, for example, 'age of equipment and facilities involved.'" (App. 266.) The district court in the *Grain Processing* case reached precisely the same conclusion. See *Grain Processing Corp.* v. *Train*, 407 F. Supp. 96, 103-104 (S.D. Iowa 1976), *appeal pending*, No. 76-1233 (8th Cir.). The Third Circuit is in accord. *American Iron & Steel Institute* v. *Environmental Protection Agency*, 526 F.2d 1027, 1043-1044 (3d Cir. 1975).

Moreover, the Act provides that the listed factors relate to "the assessment of best practicable control technology currently available" (Section 304(b)(1)(B)).[15] Thus both

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[13] A number of subcategories encompass plants making a variety of products within one general product type. An example is the Sodium Silicate Subcategory. See *infra*, at 19.

Process distinctions were made in the hydrogen peroxide and titanium dioxide subcategories. (Pet. Br. Appendix B, at 44b-49b, 71b-79b.)

[14] Cost is also a consideration. The Section lists as a factor "the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application." (§ 304(b)(1)(B).)

[15] Section 304(b)(2)(B) contains similar language regarding the factors for 1983-step guideline regulations.

the Administrator and the permit-issuing authorities are engaged in the assessment of technology, the Administrator doing so for whole categories and classes (subcategories) of sources and the permit-issuing authorities for individual sources. Both must consider the enumerated factors. The Administrator must specify them in the regulations issued under Section 304 to guide the permit officer. The permit-issuing authority must apply them in granting permits for individual plants. If the Administrator consults the factors listed in Section 304(b) to determine a range of acceptable discharges for a group of sources, the permit issuer can intelligently place an individual source within that range only by reference to the *same* factors as they bear on the individual source.

The Senate Public Works Committee, mentioning as examples several factors included in Section 304(b), made it clear that Congress intended that both the Administrator and the permit-issuing authority would apply the *same* factors:

> "In defining best practicable for any given industrial category, the Committee expects the Administrator to take a number of factors into account. *These factors should include the age of the plants, their size and the unit processes involved and the cost of applying such controls.* In effect, . . . the Committee expects the Administrator to define a range of discharge levels, above a certain base level applicable to all plants within that category. *In applying effluent limitations to any individual plant, the factors cited above should be applied to that specific plant.*" (S. Rep. No. 92-414, 92d Cong., 1st Sess., at 50 (1971), 2 *Leg. Hist.* at 1468 (emphasis added).) [16]

Secondly, EPA places great emphasis on the statement in the Conference Report that effluent limitations applica-

[16] As noted in Pet. Br. at 60, several of the courts of appeals have been troubled by the fact that the legislative history is in conflict over whether the factors set out in Section 304(b) should be applied to particular plants in permit proceedings. Portions of the legislative history in conflict with the above-quoted excerpt from the Senate Report are set out in EPA's brief at 57-59. There is, however, no ambiguity in the statute.

ble to individual plants within a category or class be "as uniform as possible." (EPA's Br. at 61, citing S. Rep. No. 92-1236, 92d Cong., 2d Sess., at 126 (1972), 1 *Leg. Hist.* at 309.) But the Report made clear it did not mean *identical* limitations applicable to all plants in a category or class. Rather, the conferees, speaking of Section 304, indicated that "the Administrator is expected to be precise in his guidelines under subsection (b) of this section," so that "*similar* point sources with *similar* characteristics . . . will meet *similar* effluent limitations." (*Id.* (emphasis added).) [17] The role of the guideline regulations was to enable the permit authorities to identify which point sources have "similar characteristics" so that "similar effluent limitations" could be imposed. Permit authorities could thereby provide uniformity of treatment without force-fitting plants into a single identical limitation regardless of differences in their "characteristics" as judged according to the relevant "factors".

In addition, because the statute speaks of applying the factors "to point sources . . . within such categories or classes" (§ 304(b)(1)(B)), EPA's original interpretation of the Act provided that the factors would be specified in the regulations and would be taken into account in issuing permits for particular plants. (See R. 6026, quoted *supra* at 6; R. 6034-6035, quoted *supra* at 8 n.4; R. 6399, quoted *supra* at 9-10 n.5.)

There is thus no "wholesale reconsideration" of factors by permit authorities. (Compare EPA's Br. at 59). The permit authorities should be guided by the factors and

[17] In view of the importance EPA attaches to this part of the Conference Report, the full text of the relevant paragraph in the Report is set out for the court's convenience:

> "Except as provided in section 301(c) of this Act, the intent of the Conferees is that effluent limitations applicable to individual point sources within a given category or class *be as uniform as possible.* The Administrator is expected to be precise in his guidelines under subsection (b) of this section, so as to assure that *similar point sources with similar characteristics*, regardless of their location or the nature of the water into which the discharge is made, *will meet similar effluent limitations.*" (S. Rep. No. 92-1236, 92d Cong., 2d Sess. at 126 (1972), 1 *Leg. Hist.* at 309 (emphasis added).)

apply them as EPA has specified them in proper guideline regulations. Because EPA has issued bare single-number limitations, it has barred any application of the factors to individual plants.[18] To support its actions EPA suggests that "generalized guidelines" would not provide sufficient specificity. (EPA's Br. at 65.) The Agency also cites the possibility of "varying views of the 27 States with approved permit programs" (*id.* at 66), and implies that some States may be too lax. EPA also complains that "each such State would be forced to hold lengthy adjudicatory procedures to consider anew the effluent limitations which the Amendments require." (*Id.*) These are spurious arguments. No cataclysmic series of events will occur if the statute is followed. EPA now has regulations prescribing an opportunity for hearings if a permit applicant disagrees with the determinations of a permit authority. (See 40 C.F.R. Parts 124 and 125, and especially 40 C.F.R. §§ 124.36 (respecting approved State authorities), 125.36 (where authority rests with EPA).) The statute itself contemplates such hearings. (See § 402(b)(3)—"an opportunity for public hearing before a ruling on each such application".) And the permit authorities are not to review the factors *de novo*; they are to select a particular limitation for each relevant pollutant parameter from the range provided in the regulations, upon consideration of the factors specified in the regulations.

EPA seeks also to rebuff petitioners' argument that the statutory language and the legislative history support regulations consisting of a range of pollutant values for each parameter. (Compare Pet. Br. at 65-69 with EPA's Br. at

[18] As noted, the issuance of a voluminous Development Document and Economic Analysis, both with no legal effect, does not comply with the statutory mandate that the regulations "specify" the factors. See *supra* at 12-13.

The present regulations do make an indirect reference to factors, but the factors themselves remain unspecified. EPA inserted into the regulations a provision allowing adjustment of the 1977-step values upon a showing that there are "fundamentally different" factors applicable to a particular plant. This provision likewise does not satisfy the specific directions in Section 304(b) as to the form and content of the guideline regulations. See *infra* at 30-31.

49-53.) EPA argues that Congress' "expectation has been satisfied." (EPA's Br. at 51.)

The Agency relies on two inconsistent arguments to support its assertion that its duty to specify a range of attainable pollution reduction for an industrial category has been fulfilled. First EPA contends that it has established ranges in the regulations by establishing subcategories for an industry and by setting a single-number limit for each subcategory, because the values for the subcategories, taken together, define a "range" for the entire category. (EPA's Br. at 51.) This argument contradicts the statute, which requires EPA to identify the reduction in terms of amounts of constituents for "*classes* and categories" of point sources. (§ 304(b)(1)(A)) (emphasis added); see also § 304(b)(2)(A).) A "class" is a subcategory of sources within an overall industry category. In addition, a "range" defined as EPA now would have it is of no use to the permit-issuing authorities for whose aid the guidelines are intended, for these authorities must issue permits to *single plants*, not to subcategories. The Act requires ranges of values in guideline regulations for classes (subcategories) as well as for categories because of the differences among individual plants in the class (subcategory). EPA's approach attempts to establish by simple fiat a non-existent homogeneity within each subcategory; here, for example it simply assumes homogeneity for plants producing a wide range of different types of sodium silicate varying by form (liquid or anhydrous—solid or powder), by chemical composition (sodium metasilicate, sodium orthosilicate, or sodium tetrasilicate), and by process (use of furnace or non-thermal reaction with caustic solution), where all plants fall within the same subcategory. (See Ex. R. 5629-5631; see also the opinion of the court of appeals in *du Pont II* at App. 281.)

EPA's second argument is that there is an *implicit* range of achievable effluent discharges, from the single-number limit set by the Administrator down to zero, and that this implicit range meets the requirements of the Act. (EPA's

Br. at 52.) The argument is without merit. The Section 304(b) regulations are meant to guide permit-issuing authorities. Specification of the maximum attainable pollution reductions, to guide permit issuers away from overly harsh restrictions which are not "practicable", is as important as the specification of minimum attainable reductions, to prevent unduly lax requirements for individual plants. The Conference Committee report (quoted *supra* at 17, n.17) shows the congressional intent that Section 304(b) guideline regulations be precise, so that national uniformity could be achieved within the system of State-issued permits established by the Act. As the report said, the goal of Section 304(b) is that "*similar* point sources with *similar* characteristics . . . will meet *similar* effluent limitations." (S. Rep. No. 92-1236, 92d Cong., 2d Sess., at 126 (1972), 1 *Leg. Hist.* at 309 (emphasis added).) Single-number regulations with an implicit range down to zero are necessarily ill-suited to guide permit-issuers called upon to grant equitable permits to the various plants because nothing in the regulations guides the permit officer in selecting a value in an implied range.

Even if the Act allowed the use of an implicit range defined by zero discharge at one extreme, such a range cannot be sustained in guideline regulations for segments of the inorganic chemicals industry. There is no evidence in the record, and it cannot be assumed, that a level of pollutant discharges at zero or close to it is attainable by application of either 1977-step or 1983-step technology to any existing point source in a number of subcategories. Absent such evidence, an implicit range including zero discharge cannot be sustained. See *American Iron & Steel Institute* v. *Environmental Protection* Agency, 526 F.2d 1027, 1046 (3d Cir. 1975).[19]

Overall, if EPA has never really come to grips with Section 304(b) in these cases, it can also be said that the court

of appeals in *du Pont II* achieved mixed results in its grappling with the Section. The court's formula of "presumptively applicable" single-number limitations draws a compromise of sorts between the positions of the parties. The court would at least give some effect to the congressional requirement of Section 304(b) that factors be specified in the regulations. In the court's view, while EPA would not have to specify the factors in bare single-number limitation regulations, the factors could be applied in permit proceedings to set the permit limitations for a particular plant. (App. 266.)

Both petitioners and EPA are dissatisfied with the *du Pont II* decision. Yet while petitioners have sought review of the ruling by the court of appeals respecting the existing-plant regulations, EPA has not done so. EPA has sought review only of the court's ruling on new source standards. EPA nonetheless asserts that the decision by

[19] The courts of appeals have differed from one another over the requirement of an explicit range of values in Section 304(b) regulations. The Third Circuit, hewing closely to the language and plan of the Act, held that Section 304(b) guidelines must specify permissible ranges of effluent reduction, in order to serve their intended purpose as useful aids for permit-issuing authorities. *American Iron & Steel Institute* v. *Environmental Protection Agency*, 526 F.2d 1027, 1044-1045 (3d Cir. 1975). The Second Circuit, ignoring the purposes underlying the requirement in this Act for ranges in the guidelines, concluded that single-number limits for each subcategory of an industry satisfy the statutory requirement because, taken together, they define a range for the entire industrial category. *Hooker Chemicals & Plastics Corp.* v. *Train*, 537 F.2d 620, 630 (2d Cir. 1976). The District of Columbia Circuit concluded that the Administrator can promulgate single-number effluent limitations pursuant to Section 301, and did not rule on any requirements for Section 304(b) effluent guideline regulations. *American Frozen Food Institute* v. *Train*, ____U.S. App. D.C.____, 539 F.2d 107, 131 (1976). The Seventh Circuit also did not address the issue. *American Meat Institute* v. *Environmental Protection Agency*, 526 F.2d 442, 448 n.13 (7th Cir. 1975). The Fourth Circuit in the present cases, *du Pont II* (App. 253-286), limited its holding on the point carefully by concluding that, for some categories, single-number limits might be permissible, as a statutory matter, but deciding whether a range is necessary in any particular regulation would involve factual determinations to be reviewed in other proceedings. (App. 265.) The court's holding was further qualified by its decision that EPA's regulations are only "presumptively applicable" to any individual point source. (*Id.*, App. 262.) Thus, the court envisioned a system of standards to be adjusted by permit-issuers, but without the guideline regulations of Section 304(b) to insure uniformity of treatment within the flexible system.

the court of appeals in *du Pont II* "is inconsistent with the statute", at least where it "invites reconsideration by the permit issuer of factors already considered by the Administrator in establishing effluent limitations under Section 301 for existing sources." (EPA's Br. at 59 n.40.)[20] If EPA was dissatisfied with the decision of the court of appeals in *du Pont II* it should have said so in its cross-petition for writ of certiorari, not in a footnote in its brief filed on October 22, 1976.[21] See *United States* v. *American Ry. Express Co.*, 265 U.S. 425, 435 (1924); *cf. Dandridge* v. *Williams*, 397 U.S. 471, 475 n.6 (1970).

The regulations Congress required be issued under Section 304(b) should not be relegated to the impotent form of a bulky and obscure "Development Document" and a similar "Economic Analysis". The guideline regulations were intended as the keystone for the Act's system of regulating discharges from existing plants. EPA should not be allowed, under the guise of exercising an implied authority under Section 301, to pick and choose among the requirements set out in Section 304(b) as to the form and content of the regulation and then to deal with these selected items as though Section 304(b) did not exist. The authority which EPA says can be implied from Section 301 cannot provide a satisfactory basis to disregard completely the statutory command in Section 304(b). Nor should implication be used to convert statutory requirements, such as the obligation to specify factors in the regulations,

[20] EPA cannot claim that the fault with the Fourth Circuit lies with the interpretation accorded the *du Pont II* decision in a subsequent case, *Appalachian Power Co.* v. *Train*, ____ F.2d ____, 9 E.R.C. 1033, 1038-1039 (4th Cir. 1976). In *du Pont II*, as in the *Appalachian Power* case, the Fourth Circuit ruled that "[i]n acting on permit applications, the issuer will properly consider cost/benefit analysis along with other factors specified in § 304(b)." (App. 28[illegible])

[21] Portions of the judgment as well as the opinion of the court of appeals are involved. The court of appeals, among other things, set aside the EPA's definition of "effluent limitations" in the concurrently-challenged general regulations (40 C.F.R. § 401.11(i), Pet. Br. Appendix C at 5c), because the definition in the regulations did not conform to the statutory definition in Section 502(11), nor to the court's view of "presumptively applicable" regulations. (See App. 261-262, 284.)

into permissive provisions contemplating mere "consideration" of the statutorily specified items by EPA. The statute is served neither by the compromise formulated by the court of appeals nor by EPA's more complete abandonment of Section 304(b).

III.

SECTION 301(b) SETS TECHNOLOGICAL OBJECTIVES AND SPEAKS OF REGULATIONS TO BE ISSUED UNDER SECTION 304(b); IT DOES NOT PROVIDE AN INDEPENDENT BASIS FOR REGULATIONS

EPA focusses on Section 301(b). Respecting regulatory power, that section stands in stark contrast to Section 304(b). Section 301(b) commands no regulations; it has no timetable for regulatory promulgation; it is not written with active verbs. The language of the section is wholly passive. Section 301(b) provides that

> "[T]here shall be achieved—
>
> "(1)(A) [by July 1977] . . . effluent limitations for point sources . . . which shall require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 304 of this Act . . . .
>
> . . .
>
> "(2)(A) [by July 1983] . . . effluent limitations for categories and classes of point sources . . . which (i) shall require application of the best available technology economically achievable . . . as determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act . . . ."

Section 301(b) does set technological objectives for discharges from existing plants. And it refers to regulations, but regulations required to be issued under Section 304(b), not under its own terms.

Congress wrote Section 301 without specifying *in that Section* who was to establish "effluent limitations" or how

such limitations were to be established. Congress's use of the passive voice in writing the Section allowed these key elements to remain unspecified. EPA has seized upon this circumstance to contend that it should be able to accord to itself a power to promulgate "limitations" in the form of regulations which have the effect of binding its regional offices and especially state permit authorities to "mechanically crank" the promulgated limitations into permits for particular plants.[22] EPA relies upon "clear and necessary implication" (EPA's Br. at 37), "interrelationship" (*id.* at 44), or assertions that such authority is "explicitly intended." (*Id.* at 33.)

Petitioners agree with EPA that Sections 301(b), 304(b) and 402 should be construed together to constitute a harmonious, corroborative statutory system. There is also agreement in general that "[t]he technological considerations defined under Section 304(b) are converted into effluent limitations under Section 301(b)" (EPA's Br. at 9), because such a statement acknowledges the linkage between these sections. But agreement stops there. Certainly there is no consensus on "[t]he operation of [EPA's present] procedure" (*id.* at 10.), as that procedure was modified by the Agency in late 1973 and 1974.

As EPA's original interpretation of the Act recognized, the roles of States and of permit proceedings are key considerations in construing these most important sections of the Act. The Act's general definition of "effluent limitation" puts these considerations in proper perspective:

> "The term 'effluent limitation' means any restriction established by a *State or the Administrator* on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are *discharged from point sources* into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance."
>
> (§ 502(11), 33 U.S.C. § 1362(11) (emphasis added).)

[22] See *CPC International Inc. v. Train*, 515 F.2d 1032, 1037 (8th Cir. 1975) ("*CPC I*").

Notably, the definition places States before, or at least on the same footing with, the Administrator in addressing the question of who is to establish the limitations. Also, the definition bears on the matter of how the limitations are to arise. It speaks of restrictions on "discharge[s] from point sources", *i.e.*, particular plants, and it includes "schedules of compliance", which can only arise in discharge permits for particular plants.

EPA's present position bypasses these and many other statutory indicia, in favor of an emphasis on "uniformity" and "uniform national effluent limitations". (EPA's Br. at 26, 27, 34 n.24, 60, 62, 65.) EPA has carried its drive toward uniformity well beyond the statutory bounds.

Congress did speak of "uniformity". But it did not embrace the rigid, unbending uniformity EPA seeks; in the discussion of Section 304(b), not Section 301(b), the Conference Report spoke of limitations at individual plants which were "as uniform as possible". By that, the conferees meant "similar" limitations for "similar point sources with similar characteristics." [23]

This is not the rigid, mechanical, by rote uniformity which EPA would impose on the statute. "Similarity" does not mean "identity".[24]

Representative Blatnik, Chairman of the House Public Works Committee, warned against precisely the type of Federal "uniformity" which EPA's about-face interpretation seeks to invoke:

> ". . . [L]et us not kid ourselves that the Federal establishment operating by itself can implement an effective water quality program. Unless we have meaningful local and State participation and not a Federal dictatorship, the program will founder on the rocks

[23] The text of the relevant part of the Conference Report is set out *supra*, at 17 n.17.

[24] Compare EPA's Br. at 61 with Pet. Br. at 55, 57-61, and *supra*, at 16-17. See also R. Zener, *The Federal Law of Water Pollution Control*, in *Federal Environmental Law*, at 703 n.98 (E. Dolgin and T. Guilbert ed. 1974), quoted in Pet. Br. at 61.

of the generally inflexible[,] Washington dictated approach." (118 Cong. Rec. 10206 (1972), 1 *Leg. Hist.* at 355.)

Representative Blatnik also addressed the other side of the coin—the matter of State adherence to EPA's guideline regulations:

> ". . . [T]his bill requires that State and regional programs follow stringent Federal guidelines. It will not allow the industrial equivalent of forum shopping. Each State's program will preclude this because they must be consistent with the guidelines." (*Id.* at 355-356.)

In short, Congress did not share EPA's subsequently-expressed fear that States would be too "lax". (App. 193, R. 6501.) Congress provided for States to accede to the permit-issuing role (§ 402(b)-(f)), and Congress as a matter of policy recognized "the primary responsibilities and rights of States" to regulate discharges. (§ 101(b).)

In the face of the statutory structure, EPA's arguments that Congress left to implication these most important regulations for existing plants are unpersuasive. When Congress desired to have EPA write standards as such, it knew how to express such a desire in explicit terms. As the Eighth Circuit noted in the *CPC I* case, "[o]ther sections of the Act demonstrate that the omission of such a provision [for limitations by regulation] was not oversight, for Congress provided unambiguously for the promulgation of national standards in other sections of the Act." *CPC International Inc.* v. *Train,* 515 F.2d 1032, 1038 (8th Cir. 1975) ("*CPC I*"). The Eighth Circuit cited national standards of performance for new sources (§ 306(b)(1)(B)), national standards for toxic pollutants (§ 307(a)(2)), and national pretreatment standards for both new and existing sources (§ 307(b) and (c)). As the Eighth Circuit said,

> "In providing for national standards in these areas, Congress did four things: (1) it used the term 'standards,' a word which takes on a special meaning because of its use under the Act; (2) it expressely provided that the standards were to be published by regulation; (3) it put deadlines on the process, requiring that the Administrator publish the standards within fixed periods of time; and (4) it provided that standards were to be enforceable independently of the permit system. *See* § 306(e); § 307(d)." (*Id.*, 515 F.2d at 1038.)

Congress did none of these things for limitations by regulations—it never spoke of such regulations at all. By way of contrast, for the guideline regulations under Section 304(b) it did all of the listed things except the last. And then, respecting enforceability, Congress provided that the limitations in the permits were to be the enforceable regulatory measures. (See § 309(a)(1), (a)(3), (c)(1), and (d).)

EPA's argument is especially difficult to accept because it would override a specific statutory mandate for guideline regulations with an authority which must be drawn purely from implication. As discussed in the opening brief (Pet. Br. at 35, 40), the fact that Congress so explicitly set out EPA's obligation to issue guideline regulations implies strongly that it denied to the Agency the power to do something different. *Durousseau* v. *United States,* 6 Cranch [10 U.S.] 307, 314 (1810); see also *Continental Casualty Co.* v. *United States,* 314 U.S. 527, 533 (1942).[25] Especially is this so where Congress has in other areas of the statute provided explicitly for the type of specific standards which EPA here seeks to imply.

There is one further circumstance which is even more compelling. With one exception, *Congress never required EPA to issue both regulations in the form of guidelines and regulations in the form of standards for the same subject matter.* It chose one or the other. For the one exceptional case, the legislative history notes carefully that EPA is to

[25] Under the circumstances, EPA's position receives no support from Section 501(a), 33 U.S.C. § 1361(a), which grants the EPA Administrator authority "to prescribe such regulations as are necessary to carry out his functions under the Act." The question presented here is whether one of EPA's functions under the Act is to issue limitations by regulation. Compare EPA's Br. at 37.

issue both types of regulations and that the one authority is in addition to the other. The exceptional case arises respecting pretreatment standards for existing plants. Section 304(f)(1) requires EPA to issue pretreatment guidelines:

> "(f)(1) For the purpose of assisting States in carrying out programs under Section 402 of this Act, the Administrator shall publish within one hundred and twenty days after the enactment of this title, and review at least annually thereafter and, if appropriate, revise guidelines for pretreatment of pollutants which he determines are not susceptible to treatment by publicly owned treatment works." [26]

Then Section 307(b) directs the Administrator in addition to issue proposed pretreatment standards within 180 days and to issue final pretreatment standards within 90 days thereafter. (Section 307(b)(3) authorizes the pretreatment standards to be published by categories of sources.) With reference to these provisions the Senate Report states:

> "[The Administrator] is also required to publish guidelines for establishing pre-treatment standards for pollutants discharged into publicly owned treatment works, and guidelines for establishing procedures and test protocols for the analysis of pollutants in permit applications. *It should be noted that this authority is in addition to the authority of the Administrator to establish pre-treatment standards directly under Section 307.*" (S. Rep. No. 92-414, 92d Cong., 1st Sess., at 54, 2 *Leg. Hist.* at 1472 (emphasis added).)

Finally, EPA relies (EPA's Br. at 37-38) heavily on Section 301(c) which provides that

> "The Administrator may modify the requirements of subsection (b)(2)(A) [1983 step] with respect to any point source for which a permit application is filed after July 1, 1977 upon a showing that . . . such modified requirement (1) will represent the maximum use

[26] Furthermore, the pretreatment guidelines to be issued under Section 304(f)(1) are not specifically required by the statute to be issued in the form of regulations. In contrast, Section 304(b) mandates promulgation of guideline regulations with a very explicit content.

> of technology within the economic capability of the owner or operator; and (2) will result in reasonable further progress toward the elimination of the discharge of pollutants."

EPA argues that there would be no need for this provision for case-by-case relief if the only way effluent limitations could be imposed is in permits rather than by regulation. (EPA's Br. at 38.)

EPA mistakes the thrust of Section 301(c). Section 301(c) authorizes the Administrator on a showing specified by the statute to relieve a particular point source from complying with the 1983-step technological criterion, reflected in the guideline regulations by ranges of pollutant values and by a specification of factors. In other words, Section 301(c) authorizes the Administrator to prescribe limitations for a particular "point source" which are more lenient than the most permissive of the values in the technology-based range set out in the guidelines. Section 301(c) thus gives the Administrator authority to sanction limitations for a particular plant which rest on a technology more lenient than the "best available technology economically achievable" which is specified as the objective for 1983 by Section 301(b)(2)(A).

Moreover, the language of Section 301(c) makes no reference whatsoever to "effluent limitations". Instead, the section refers to the "requirements of subsection (b)(2)(A)". In subsection (b)(2)(A), the requirements are spelled out as being the achievement of technology-based limitations "determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act". Thus by speaking of "requirements", Section 301(c) is in fact speaking of the 1983-step guideline regulations, as described in the foregoing paragraph. Undeterred, EPA points to the Third Circuit's remark that "§ 301(c) itself seems to support the Administrator's position by presupposing the existence of a section 301 effluent limitation which the Administrator can relax." EPA's Br. at 38, quoting *American Iron & Steel Institute* v. *Environ-*

mental Protection Agency, 526 F.2d 1027, 1037 n.15 (3d Cir. 1975). EPA then seeks to convert Section 301(c) into an argument for effluent limitations by regulation under Section 301(b). Both the comment by the court in the *American Iron & Steel* case and EPA's bootstrap argument ignore the precise language of Section 301(c), and try to make over the words of the Section into a different type of provision entirely.

Much the same difficulty arises with respect to a provision in all of EPA's 1977-step guideline regulations, referred to variously as a "modification" provision or a "variance" clause. The provision allows a permit authority to propose to the Administrator for his approval limitations for a particular plant different from the guideline values if "fundamentally different" factors are found to be present. (*E.g.*, 40 C.F.R. § 415.62, Pet. Br. Appendix B, at 31b-32b.) The Fourth Circuit has ruled that this clause is too restrictive because it does not allow permit authorities sufficient latitude to consider the factors required to be taken into account by Section 304(b)(1)(B) and (b)(2)(B). See *e.g.*, *Appalachian Power Co.* v. *Train*, —F.2d—, 9 E.R.C. 1033, 1038-1039 (4th Cir. 1976). On the other hand, the provision was upheld in *Natural Resources Defense Council, Inc.* v. *Environmental Protection Agency*, 537 F.2d 642, 645-646 (2d Cir. 1976), but the Second Circuit there stated that it was not passing on the validity of the EPA modification provision as applied in a particular case. The Second Circuit expressed its reservations by observing that "[w]ithout variance flexibility, the program might well founder on the rocks of illegality." (*Id.*, 537 F.2d at 647.) [27]

Arguments respecting whether or not the EPA modification clause is too restrictive have an artificial ring in the context of the present cases, because these arguments are

[27] As the Second Circuit said: "Not all of the thousands of plants in operation can be expected to fit into prefabricated molds or templates. By specifying a permit procedure, Congress implicitly conferred on the *permit-grantor* the privilege of construing the broader regulations in light of the specific type of plant applying for the permit." (*Id.*, 537 F.2d at 647 (emphasis added).)

entirely dependent upon acceptance of EPA's basic contention that it can promulgate bare single-number limitations under Section 301(b). If the Act is properly construed, there should be no need for such a clause at all. EPA should issue guideline regulations complying with the explicit mandate of Section 304(b). Those guidelines would not need a special clause because they ordinarily would contain ranges of values for pollutant parameters and would always contain a specification of factors to guide selection of a number from each range.

The unnecessary controversy over the validity of the modification clause serves to emphasize the difficulties arising in trying to accommodate EPA's present position to the statute. If EPA can promulgate limitations by regulation, rather than having them set by permit authorities based upon guideline regulations, a number of statutory provisions either require strained interpretation to become workable, or become dead letters, or have unintended harsh effects.

IV.

THE ACT IS STRUCTURED FOR GUIDELINE REGULATIONS, NOT LIMITATIONS BY REGULATION

In the opening brief, petitioners pointed to a number of adverse collateral consequences which would arise with various provisions in the Act if guideline regulations were replaced by a force-fit promulgation of limitations by regulation. (Pet. Br. at 75-85.) EPA has responded by contending that "the other statutory provisions upon which petitioners rely are not inconsistent with promulgation of limitations by regulation" (EPA's Br. at 46 (capitalization omitted)), and further that "the interrelationship among various provisions" confirms EPA's authority. (*Id.* at 44 (capitalization omitted).)

EPA's response, however, conspicuously omits any mention of a number of the affected collateral provisions of the Act.

A. Advisory Committee Review

For example, EPA nowhere cites Section 515, which expressly calls for Advisory Committee review of proposed guideline regulations, along with new source standards and other mandated standards, but does not refer in any way to limitations by regulation. In pertinent part, Section 515 provides—

> "(b)(1) No later than one hundred and eighty days prior to the *date on which the Administrator is required to publish any proposed regulations required by section 304(b) of this Act,* any proposed standard of performance for new sources required by section 306 of this Act, or any proposed toxic effluent standard required by section 307 of this Act, he shall transmit to the Committee a notice of intent to propose such regulations. The Chairman of the Committee within ten days after receipt of such notice may publish a notice of a public hearing by the Committee, to be held within thirty days." (Emphasis added.)

Surely if Congress had intended the guideline regulations to be overridden by limitations regulations, it would have focussed the Advisory Committee's attention on the limitations regulations. It makes utterly no sense for the Committee to be concerned on the one hand with important new source standards and toxic effluent standards and on the other hand with guidelines which according to EPA do not even take on the form of actual regulations.

B. Periodic Revision of Permits and of Regulations

Similarly, EPA does not cite nor refer in any respect to Section 301(d). That Section calls for periodic review of limitations:

> "Any effluent limitation required by paragraph (2) of subsection (b) of this section shall be reviewed at least every five years and, if appropriate, revised under such paragraph."

EPA would rather ignore this Section because it, like Section 301(c), does *not* speak of limitations promulgated

by regulation under Section 301(b). (See *supra*, at 28-30.) Instead, Section 301(d) also carefully is written in terms of "[a]ny effluent limitation required by paragraph (2) of subsection (b) of this section." That precisely worded cross-reference, like the comparable reference in Section 301(c), is to technology-based limitations "determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act." (§ 301(b)(2).) Thus again, Section 301(d) in fact draws upon the 1983-step guideline regulations promulgated under Section 304(b).

And there is no conflict in the fact that Section 301(d) calls for periodic five-year review of limitations while Section 304 calls for review of the guideline regulations "at least annually." Section 301(d) is concerned with limitations determined in accordance with the guideline regulations. Those limitations actually appear in discharge permits. The permits are issued "for fixed terms not exceeding five years." (§ 402(b)(1)(B).) In sum, the guideline regulations themselves are to be reviewed at least annually, but because permits have up to five-year terms, review of the resulting limitations can occur on a periodic five-year basis and can reflect application of the revised guidelines in effect at the time of the permit renewal.

Provisions such as Section 301(d) illustrate that the statute may not be written in elegant or concise language but that the provisions do make sense if they are construed together.

C. Enforcement and Judicial Review

EPA also mangles Section 309, which provides for Federal enforcement of the Act. The Agency does not say so directly, but it appears to claim that power has to be implied for it to issue limitations by regulation or otherwise it will not be able to enforce directly any effluent regulations against existing plants. (See EPA's Br. at 45.) EPA at least complains that

"none of [the provisions of Section 309] requires compliance with the guidelines promulgated under Section 304, authorizes enforcement proceedings against noncompliance therewith, or makes such noncompliance illegal." (EPA's Br. at 45.)

The complaint is not valid. Congress did *not intend* that the guideline regulations be directly enforceable, in contrast to national standards such as those issued under Section 306 (for new sources), 307(a) (for toxic pollutants), and 307(b) and (c) (for pretreatment). Direct enforcement would not be practicable for regulations which were written in terms of ranges of values with a specification of factors. Congress instead provided for enforcement of the limitations in the permits, which limitations would be derived from the guideline regulations. Section 309 explicitly so provides. See § 309(a)(1), (a)(3), (c)(1), and (d). Several portions of Section 309 do refer directly to a "violation of Section 301" (*e.g.*, § 309(c)(1)), but these references have nothing to do with effluent limitations by regulation; the references allow for enforcement by EPA of the bar in Section 301(a) against making any discharge without a permit, and of the bar in Section 301(f) against any discharge of "radiological, chemical, or biological warfare agent or high-level radioactive waste."

In the past, EPA has abjured any intent to create a massive new criminal code by implication. It should maintain that course. (See Pet. Br. at 79 n.69.)

EPA's about-face interpretation also creates problems with Sections 505 and 509, the provisions for citizen enforcement suits and for judicial review, apart from the jurisdictional issue in this case discussed *infra*. (See Pet. Br. at 80-84.) EPA's response (EPA's Br. at 41-43) misstates petitioners' arguments in several material respects, especially regarding the interplay of these sections with Section 301(c).[28] Both Sections 505(f)(2) and 509(b)

[28] Section 301(c) authorizes the Administrator to depart from the 1983-step requirements for a particular plant upon economic grounds, where a specified factual showing has been made. See *supra*, at 28-30.

(1)(E) refer to an "effluent limitation or other limitation under section 301 . . . [and other sections]." Both of these references encompass the Administrator's action pursuant to Section 301(c) to issue limitations for an individual point source. (Compare Pet. Br. at 80, 82 n.72, 84 n.74 with EPA's Br. at 42 n.28.) EPA wrongly asserts that petitioners would accord no meaning to the reference in Section 509(b)(1)(E) to "promulgating" limitations (EPA's Br. at 42 n.28); in fact petitioners argue that the reference is necessary to provide review of the Administrator's action to issue limitations under Section 301(c).[29] The reference does not support any implied limitations regulations under Section 301(b).

EPA also errs in stating petitioners' views respecting Section 505(f)(2). As EPA would have it, petitioners are arguing that Section 505(f)(2) allows citizens to "challenge" or seek review of the Administrator's action to issue limitations for a particular plant under Section 301(c). (See EPA's Br. at 43-44 n.30.) Petitioners do not take such a position. Section 505(f)(2) was included by Congress in the Act to allow citizens to sue to *enforce* limitations set by the Administrator acting under Section 301(c). If a citizen desired to seek review of the Administrator's action under Section 301(c), the citizen could bring a petition for review in a court of appeals under the authority provided by Section 509(b)(1)(E), as described *supra*, in the immediately preceding paragraph.

EPA in short has tried to turn aside petitioners' argument that EPA's present theory of implied authority for regulations would render useless portions of Sections 505 and 509, by making the same argument in reverse. (See EPA's Br. at 43.) Because EPA's attempt rests upon a double misstatement of petitioners' views, however, the

[29] Respecting a somewhat similar provision in the Clean Air Act, the word "promulgating" has been construed to include both the procedural and substantive aspects of a covered EPA action. See *United States* v. *Adamo Wrecking Co.*, —F.2d—, No. 75-1967 (6th Cir., decided November 1, 1976). See also *infra*, at 41 n.36, discussing *Micnus River Preservation Committee* v. *Environmental Protection Agency*, —F.2d—, 9 E.R.C. 1174 (2d Cir. 1976).

Agency has not addressed the real problems its position creates with the operation of Sections 505 and 509.

D. EPA Veto Power Over State Permits

Finally, EPA devotes only a brief footnote to Section 402(d). This Section empowers EPA to veto State discharge permits which are "outside the guidelines and requirements of the Act." (§ 402(d)(2).) This provision was the subject of intense consideration and debate in the House of Representatives. (See Pet. Br. at 51-55.) It was also the focus in the Conference Committee for resolving the relative allocation of power to the States and to EPA respecting permits. (Pet. Br. at 55-57.) Congressional action on Section 402(d) is most pertinent to this Court's resolution of this case. As the Eighth Circuit said in its *CPC II* decision:

> "Section 402(d)(2) expressly provides that the EPA may halt issuance of any state-issued permit if it determines that the conditions of the permit do not comply with the guidelines issued under § 304(b). See *id.* [515 F.2d] at 1037 n.11, 1038 and 1038 n.14. *The reference in this veto provision to the § 304(b) guidelines and the extensive debate which preceded the addition of § 402(d)(2) to the final draft of the statute are inconsistent with the EPA's contention that it has the power to issue effluent limitations for existing plants by regulation under § 301.* The District of Columbia Circuit and the Seventh Circuit ignore this language. The Third Circuit deals with the language, *see American Iron & Steel Institute* v. *E.P.A., supra,* at 1040-1041, but its reasoning is unpersuasive."
>
> (*CPC International Inc.* v. *Train,* ——F.2d——, 9 E.R.C. 1301, 1302 n.1 (8th Cir. 1976) (emphasis added).)

Without discussion, EPA summarily asserts in its footnote that "the term 'guidelines' here [in Section 402(d)] refers to guidelines under Section 304(h), concerning uniform monitoring, reporting, and information requirements, not to Section 304(b)." (EPA's Br. at 45 n.31.) This is not correct.[30] Section 402(d)(2) was added to the bill during the Conference Committee deliberations, specifically to respond to the House debate over EPA's role in State-issued permits and over the weight to be ascribed to the guideline regulations under Section 304(b). (See Pet. Br. at 54-55; see also *supra,* at 25-26.) The summary offered by Senator Muskie during floor debate on the Conference Report in the Senate was not only explicit on the matter; it was emphatic. (See 118 Cong. Rec. 33698 (1972), 1 *Leg. Hist.* at 176, quoted in Pet. Br. at 56.) Moreover, EPA's original, contemporary construction of Section 402(d)(2) contradicts its present position. In September 1973, EPA's position was that—

> "After a state program is approved by EPA, *each permit* (except in categories that may be waived by EPA) *is subject to EPA review and veto to ensure its consistency* with requirements of the law, including deadlines, and *with EPA's effluent guidelines.*"
>
> (Council on Environmental Quality, *Fourth Annual Report,* at 175 (September 1973) (emphasis added).)

Again, EPA has had to distort the words of the statute and the intent of Congress to force-fit promulgation of limitations by regulation. This Court should not sanction EPA's about-face construction.

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[30] Congress made an express and explicit designation of guidelines under Section 304(h)(2) whenever it decided to refer to those "procedural" guidelines. § 304(h)(2); see §§ 402(c)(1); 402(e). Also, the explicit references to Section 304(h)(2) occur in the statute when the context indicates procedural matters would be pertinent. Still further, the references to Section 304(h)(2) were in the bill long before the Conference Committee revised Section 402(d) to resolve the matter of EPA veto of State-issued permits based upon the Section 304(b) guidelines. See, e.g., H. R. 11896, 92d Cong., 2d Sess., at §§ 402(c)(1) and (e) (which even at that time already contained references to Section 304(h)(2)), and § 402(d)(2) (which then contained no reference to any guidelines, because this House-passed bill limited any EPA veto of a State-issued permit to instances where a discharge in one State affected the waters of another State) (1972), 1 *Leg. Hist.* at 893, 1057-1059.

V.

THE JURISDICTIONAL ISSUE IS WHETHER COURTS OF APPEALS HAVE EXCLUSIVE JURISDICTION TO REVIEW EFFLUENT GUIDELINE REGULATIONS UNDER SECTION 304(b), WHERE THE COURT DETERMINES THAT EPA CANNOT ACCORD TO ITSELF BY IMPLICATION AN AUTHORITY TO PROMULGATE LIMITATIONS BY REGULATION UNDER SECTION 301(b)

EPA's arguments respecting jurisdiction miss the mark entirely. Petitioners did not and do not take the jurisdictional positions ascribed to them in EPA's brief. EPA has set up its own straw-man argument and has duly knocked it down.

Petitioners do not argue, as EPA says petitioners do,

> "that even if the Administrator has authority to promulgate effluent limitations under Section 301 (which are reviewable in the courts of appeals), the guidelines upon which those limitations are based are reviewable only in district courts."
>
> (EPA's Br. at 79.)

Most of EPA's argument on the jurisdictional issue is directed toward this faulty statement. (See EPA's Br. at 79-83.)[31] In fact, if the focus of the jurisdictional issue were on the argumentative point as stated by EPA in the foregoing quotation, petitioners would agree with the Agency. If one were to accept EPA's assertion that effluent limitations can be promulgated by regulation, it would make no sense to split review of limitations regulations from the effluent guidelines "regulations" which the limitations regulations would override. (In this event, EPA's guideline regulations under Section 304(b) virtually disappear anyway. EPA says it can find them in the "Development Document" and the "Economic Analysis" but aside from the fact that those books have no legal effect, the

[31] EPA restates the matter at one point as "Petitioners' proposal for bifurcated review." (*Id.* at 82.)

prospect of a court's having to search for "regulations" in those voluminous documents would bar any real review.)

Given this error in EPA's brief, petitioners in this reply brief will focus only on making a correct comparative statement of the positions of the parties.

A. Petitioners' Arguments

Petitioners argue as follows:

As a consequence of Assistant Administrator Kirk's well-publicized February 1974 memorandum,[32] petitioners recognized that "protective" petitions for review would have to be filed in a court of appeals. EPA had announced in the memorandum that it intended to claim that its regulations were limitations and to argue further that the 90-day time limitation in Section 509(b)(1) applied to such review. Petitioners filed such "protective" petitions in timely fashion in the Fourth Circuit. Those petitions are now before this Court as No. 75-1473.[33] Concurrently, petitioners filed a complaint in the U.S. District Court for the Western District of Virginia, seeking review of several of the same effluent regulations for which review was sought in the Fourth Circuit, but on the basis that EPA's regulations were guidelines issued under Section 304(b). This district court action has come before this Court as No. 75-978.

Respecting the "protective" petitions for review, petitioners have never questioned that the courts of appeals had jurisdiction to resolve their own jurisdiction. And to resolve the jurisdictional question, the structure of the statute and especially Section 509(b)(1) requires the court of appeals to consider the threshold question whether EPA can accord to itself by implication an authority to promulgate limita-

[32] See Pet. Br. at 20, citing and quoting from Memorandum from Alan G. Kirk, II, to Acting Assistant Administrator for Air and Water Programs, at 2, February 25, 1974, reproduced in BNA *Environment Reporter*, Current Developments, at 1833-1834 (March 1, 1974).

[33] A separate set of petitions for review of EPA's new source standards issued under Section 306 were timely filed in the Fourth Circuit. No jurisdictional question arises respecting those petitions, and they are before this Court in No. 75-1705, the EPA's cross-petition.

tions by regulation under Section 301(b). This Court's prior decisions so provide. See *Federal Communications Commission* v. *Columbia Broadcasting System of California, Inc.*, 311 U.S. 132 (1940); *Cheng Fan Kwok* v. *Immigration and Naturalization Service*, 392 U.S. 206 (1968); *cf. National Railroad Passenger Corp.* v. *National Ass'n of Railroad Passengers*, 414 U.S. 453, 456 (1974); *Montana-Dakota Utilities Co.* v. *Northwestern Public Service Co.*, 341 U.S. 246 (1951); *Bell* v. *Hood*, 327 U.S. 678 (1946). If the court of appeals decided that under the Act EPA could draw upon implications and accord to itself a power to issue limitations by regulation, then it would take jurisdiction over the petitions and resolve all questions relating to the regulations. See, *e.g.*, *American Iron & Steel Institute* v. *Environmental Protection Agency*, 526 F.2d 1027 (3d Cir. 1975). If the court of appeals decided that the Act required EPA to issue guidelines and not limitations, then it should dismiss the petitions for lack of jurisdiction, *CPC International Inc.* v. *Train*, 515 F.2d 1032 (8th Cir. 1975),[34] although it could conceivably exercise jurisdiction to review the guideline regulations either under an expansive reading of Section 509(b), *du Pont I* (App. 250), or, more preferably, under a pendent jurisdiction exercised where the parties had sought review of new source standards concurrently issued on the same record. *Romero* v. *International Terminal Co.*, 358 U.S. 354, 380-381 (1959); *cf. Cheng Fan Kwok* v. *Immigration and Naturalization Service*, 392 U.S. 206, 216 n.16 (1968).[35]

[34] Review would then be had in a district court action. See, *e.g.*, *Grain Processing Corp.* v. *Train*, 407 F. Supp. 96 (S.D. Iowa 1976), *appeal pending*, No. 76-1233 (8th Cir.).

[35] EPA's brief seems to imply that the Administrator's mere assertion of authority to issue limitations by regulation grants power to the court of appeals to resolve all questions relating to a "protective" petition which pertains to such regulations. (EPA's Br. at 78-79.) EPA's brief states petitioners "apparently recognize" this position. (*Id.* at 79.) Petitioners do nothing of the sort. EPA's mere assertion grants to the court of appeals the power only to decide those matters necessary to resolving its own jurisdiction. Consideration and decision of all other matters of whatever nature must rest upon a prior determination that jurisdiction exists.

In this Court, petitioners adhere to the foregoing positions. (Pet. Br. at 85-96.) As a matter of emphasis, petitioners here argue that this Court (1) should follow the Act's mandate to issue guideline regulations under Section 304(b) and reject EPA's claim of power to issue limitations by regulation, and (2) should then construe the Act, and especially Section 509(b)(1), to allow courts of appeals to take pendent jurisdiction to review guideline regulations where the petitioning parties seek review of new source standards concurrently issued on the same administrative record.

Recognition of jurisdiction in courts of appeals based upon pendent jurisdiction would preserve the work of the court of appeals in *du Pont II* in reviewing painstakingly the record support for EPA's specific actions in the eleven of the twenty-two subcategories of the inorganic chemicals industry involved in this case. It would do so on a basis which would not involve an expansive reading of Section 509(b)(1). Such an expansive reading, as made by the court of appeals in *du Pont I* (App. 250), would create even more difficulty than that already present for other jurisdictional matters arising under Section 509(b)(1).[36]

[36] Section 509(b) is a procedural minefield. Even apart from the jurisdictional issue posed in this case, problems of interpreting the provision have plagued both district courts and courts of appeals. To date, four decisions have been rendered by the Second and Third Circuits construing Section 509(b) in factual situations other than that presented here, and in each case the court ruled that the would-be petitioner or plaintiff had started in the wrong court. In chronological order, those cases are: *Sun Enterprises, Ltd.* v. *Train*, 532 F.2d 280 (2d Cir. 1976) (district court has no jurisdiction to review EPA's issuance of a discharge permit; later-filed petition for review in court of appeals was barred by Act's 90-day time limitation on bringing such petitions); *Bethlehem Steel Corp.* v. *Environmental Protection Agency*, 538 F.2d 513 (2d Cir. 1976) (court of appeals does not have jurisdiction over petition to review EPA's action under Section 303 approving portion of New York's water quality standards); *Mianus River Preservation Committee* v. *Environmental Protection Agency*, __F.2d__, 9 E.R.C. 1174 (2d Cir. 1976) (where the EPA failed to take affirmative action within 90 days under Section 402(d) to veto a discharge permit issued by Connecticut, the court of appeals does not have jurisdiction to review the issuance of the discharge permit); *American Iron & Steel Institute* v. *Environmental Protection Agency*, __F.2d__, Nos. 75-2124 and 75-2128 (3d Cir.,

It would also expand the scope of the very harsh review-preclusion [37] and limitation clauses in Section 509(b),[38] to the detriment of the unsuspecting. See Pet. Br. at 92 n.79, discussing *Yakus* v. *United States*, 321 U.S. 414 (1944). On the other hand, exercise of pendent jurisdiction would allow the Court to serve the same interest in judicial economy expressed by Judge Widener in his opinion for the court of appeals in *du Pont I*, but without these adverse collateral consequences. Judge Widener's opinion noted that petitions to review new source standards had to be brought in courts of appeals under Section 509(b)(1)(A), and observed that review by district courts of guideline regulations could waste judicial manpower where the new source standards were issued on the same admin-

decided October 5, 1976) (court of appeals has no jurisdiction to review EPA's promulgation of Net-Gross Adjustment Regulations issued under Sections 402, 405 and 501 of the Act).

Of these cases, the *Mianus River* decision appears to be incorrect at least in part, because the "approving" language of Section 509(b)(1)(E) gives jurisdiction to a court of appeals to review a State-issued permit at least insofar as the Administrator's review of such a permit is concerned. (See Pet. Br. at 87; compare EPA's Br. at 42 n.28.) Petitioners in the *Mianus River* case argued for jurisdiction in the court of appeals on the ground that EPA's review of the permit, however perfunctory, was an "Administrator's action . . . in issuing . . . [a] permit" reviewable under § 509(b)(1)(F); the court did not consider or discuss the question whether the Administrator's action was reviewable under § 509(b)(1)(E) because EPA's action had the effect of "approving" the limitations in the permit.

[37] See Section 509(b)(2). Respecting a similar provision in the Clean Air Act, courts have held that the validity of an emission standard promulgated by EPA in the form of regulations is not reviewable in a criminal action for violation of the standard. *E.g., United States* v. *Adamo Wrecking Co.*, __F.2d__, No. 75-1967 (6th Cir., decided November 1, 1976); *but cf. United States* v. *Independent Stave Co.*, 406 F. Supp. 886 (W.D.Mo. 1975).

[38] The requirement in Section 509(b)(1) that any petition for review of the actions there specified be brought within 90 days has been construed as a statute of limitations. See *Sun Enterprises, Ltd.* v. *Train*, 532 F.2d 280 (2d Cir. 1976). It might, however, more properly be considered a jurisdictional requirement. *Cf. Union Electric Co.* v. *Environmental Protection Agency*, __U.S.__, 44 U.S.L.W. 5060, 5062-5063 & n.4 (June 25, 1976).

istrative record concurrently with the guideline regulations. (App. 249-250.) See Pet. Br. at 89-91.[39]

B. EPA's Arguments

EPA says that it has implied authority to promulgate effluent limitations by regulation under Section 301 and that under Section 509(b)(1)(E) review of such regulations is exclusively in the courts of appeals. (EPA's Br. at 78.)[40]

In the main, the remainder of EPA's argument on jurisdiction is irrelevant, resting as it does on a misstatement of petitioners' arguments.

EPA does include a long footnote setting out the numerous cases various parties have brought in district courts to review EPA's regulations for existing plants, on the basis that those regulations are guideline regulations issued under Section 304(b). (See EPA's Br. at 83-84 n.57)[41]

In another long footnote, EPA addresses itself to petitioners' arguments directed toward exercise by courts of appeals of a pendent jurisdiction. (See EPA's Br. at 85, 86 n.59.) EPA says, among other things, "we agree that it would be inappropriate to vacate the judgment of the court of appeals insofar as it made those modifications in the effluent limitations [or guidelines, depending upon one's views] and remand the case to the district court to consider those issues." (*Id.* at 86 n.59.) Beyond setting out the

[39] EPA's brief ignores entirely the divided-review considerations expressed in Judge Widener's opinion. Compare EPA's Br. at 79-83, where EPA addresses at great length the false divided-review issue involving the Section 304(b) regulations and regulations implied from Section 301(b), which rests on EPA's misstatement of petitioners' arguments. See *supra*, at 38-41.

[40] Assuming *arguendo* that the premise is correct, petitioners would not contest the conclusion, even as to and including guideline regulations. See *supra*, at 38.

[41] Respecting EPA's footnote, petitioners would add to EPA's enumeration one further district court case: *Delicate, et al.* v. *Train*, Civil Action No. 76-5028 (D.S.D., complaint filed April 15, 1976) (ore mining and dressing regulations).

foregoing quotation, petitioners will not attempt to restate EPA's views on pendent jurisdiction.

C. Congressional Action To Date

Congress could resolve for the future the jurisdictional issue in these cases by amending the Act to specify the forum in which actions to review EPA's guideline regulations could be brought. Congress in 1973 made such an amendment to Section 509(b) to specify that actions to review pretreatment standards promulgated under Section 307 could be brought in the courts of appeals. See Pub. L. 93-207, 87 Stat. 906, § 1(6) (December 28, 1973), amending Section 509(b)(1)(C).

Earlier this year, on June 3, 1976, the House of Representatives passed a bill which would have amended the Act to provide that review of guideline regulations issued under Section 304(b) was in the courts of appeals under the terms of Section 509(b)(1). See 122 Cong. Rec. H 5285-5288 (daily ed. June 3, 1976) (passage of House version of S. 2710, 94th Cong., 1st Sess. (1975), section 18 of which would have amended Section 509 of the Act). The bill did not go immediately to a Conference Committee. Rather, on September 1, 1976, the Senate considered and adopted a motion to concur in the House amendments to S. 2710, with further amendments. (122 Cong. Rec. S 15189 (daily ed. September 1, 1976).) Among other things, the Senate stripped from the bill a variety of provisions including the House-passed Section 18 which would have given jurisdiction to courts of appeals to review by petition EPA's promulgation of guideline regulations under Section 304(b). See 122 Cong. Rec. S 15165 (daily ed. September 1, 1976) (the cited summary of "Provisions Of House Amendment Not Adopted By Committee" wrongly states the effect of the House-passed Section 18). Thereafter, agreement could not be reached on the different versions of S. 2710 passed by the Senate and House, and the bill died upon the adjournment of the 94th Congress.

The jurisdictional issue thus remains in these cases, both as to previously-filed actions and as to actions which may be brought in the future.

CONCLUSION

In this case, and the companion cases—Nos. 75-1473 and 75-1705, the issues of statutory construction concern a very detailed statute filled with cross-references and dependent phrases and clauses. Similarly, the Court has before it a large administrative record which sets out in considerable detail EPA's step-by-step actions in issuing the regulations before the Court, and in so doing, in arriving at the position it now espouses. These cases are quite complex because of EPA's efforts to evade or avoid the express commands of Section 304(b), but the Court has the great advantage of having before it the materials necessary to reach its decision.

These cases are unusual in that the issues as to the effect and content both of the guideline regulations and of the new source standards are before this Court just as EPA has launched a new program to review, revise, and reissue *inter alia* the 1983-step regulations and the new source standards for 21 broad industry categories, including inorganic chemicals manufacturing. This program to review and reissue the regulations is apart from and in addition to review on remand of the regulations in this case, and in other similar cases. On June 7, 1976, EPA entered into an agreement with the Natural Resources Defense Council, Inc. and others to settle four cases pending in the District Court for the District of Columbia. See *Natural Resources Defense Council, Inc.* v. *Train*, ____*F.Supp.*____, 8 ERC 2120 (D.D.C. 1976).[42] The settlement agreement, which was approved by the Court, provides a timetable under

[42] The text of the settlement agreement providing the detailed program for issuing the new regulations is set out as an addendum to the district court's opinion. (*Id.*, 8 E.R.C. at 2122-2136.) Under the terms of the agreement, the revised guideline regulations and new source standards for the inorganic chemicals category are to be promulgated in final form no later than December 31, 1978. (*Id.*, 8 E.R.C. at 2125, 2131.)

which EPA will study the 21 broad industry categories and then propose and issue the new 1983-step and new source regulations. Under the timetable, the entire process is to be concluded and the new regulations are to be issued for all 21 categories by December 1979. (*Id.*, 8 E.R.C. at 2125-2126.) The decision of this Court, therefore, will resolve basic questions respecting the effect and content of the new regulations before they are formulated, rather than after vast amounts of administrative and private-party time and effort have been expended in developing new regulations based on EPA's faulty legal theory.

Several days before the filing of this brief, one further development occurred which has a bearing on this litigation. Without prior announcement or notice, EPA promulgated a series of "specialized definitions" in an "interim final amendment" to its regulations for the inorganic chemicals category. (41 Fed. Reg. 51598-51601 (November 23, 1976).) Among other things, the "specialized definitions" set out yet a new meaning for "effluent limitations."[43] This new definition also fails to comply with the statute. While the definition does provide that effluent limitations may be established by States as well as EPA, the definition omits any reference to "schedules of compliance." The statutory definition in Section 502(11) specified that effluent limitations "includ[e] schedules of compliance."

[43] In *du Pont II* the court of appeals set aside EPA's general regulation defining "effluent limitations" for all industrial categories, on the grounds that EPA's definitions did not provide for such limitations to be established by States as the statute required and also that the definition did not square with "presumptively applicable" limitation regulations. See *supra*, at 21-22 & n.21.

Petitioners had timely petitioned for review of EPA's general regulations in 40 C.F.R. Part 401, in addition to the regulations specifically relating to the inorganic chemicals category, 40 C.F.R. Part 415. (See, *e.g.*, App. 200-201.) The court of appeals thus had jurisdiction to set aside the general definition of "effluent limitation" in the regulations. (See App. 262, 284.) EPA errs when in the most recent rulemaking notice it asserted that the court of appeals had remanded certain "definitions as they pertain to portions of the Inorganic Chemicals Manufacturing Point Source Category . . . ." (41 *Fed. Reg.* 51598 (November 23, 1976).) The action by the court of appeals was not so limited.

Even putting aside the contradiction between the new definition and the statute, this most recent action by EPA underscores the Agency's efforts to reduce the role of States in carrying out the Act. In EPA's brief, much was made of the fact that States still could set schedules of compliance. (See EPA's Br. at 71-72.) Relegating States to setting schedules of compliance does not satisfy the congressional intention "to recognize [and] preserve . . . the primary responsibilities and rights of States" to control discharges. (§ 101 (b).) The newest regulations, by omitting any reference even to the schedule-of-compliance function, raise additional doubts as to the role which EPA would allot to States.

Petitioners' proposed disposition of these cases is set forth in Pet. Br. at 96-97.

Respectfully submitted,

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NOVEMBER 26, 1976

IN THE

Supreme Court of the United States

OCTOBER TERM, 1976

No. 75-978

E. I. DUPONT DE NEMOURS AND COMPANY, *et al.*,
Petitioners,

v.

RUSSELL E. TRAIN, Administrator of the Environmental Protection Agency, *et al.*, *Respondents.*

On Petition for a Writ of Certiorari to the United States Court of Appeals for the Fourth Circuit

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BRIEF OF AMERICAN IRON AND STEEL INSTITUTE AS AMICUS CURIAE

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BRIEF OF AMERICAN IRON AND STEEL INSTITUTE AS AMICUS CURIAE

INTEREST OF AMERICAN IRON AND STEEL INSTITUTE

American Iron and Steel Institute ["AISI"] is a non-profit trade association, incorporated under the laws of the State of New York, with principal offices at 1000 16th Street, NW, Washington, D.C. AISI's member companies employ over one-half million people and produce approximately 95 percent of the steel made in the United States.

The issues presented in this case are virtually identical to issues presented and decided in an action

brought by AISI in the United States Court of Appeals for the Third Circuit challenging the "effluent limitations guidelines" for the steel industry. *AISI v. EPA,* 526 F.2d 1027 (3d Cir. 1975). That case is one of those which Petitioners cited as creating a conflict among the circuits on the issues raised in their petition for certiorari.[1] The Court's decision will determine how AISI's members will be regulated under the applicable sections of the Federal Water Pollution Control Act Amendments of 1972 ["the Act"],[2] and determine whether the Third Circuit had jurisdiction over the *AISI v. EPA* case.

This brief is being filed with the consent of the parties to this case.[3]

SUMMARY OF ARGUMENT

A. Jurisdiction To Review These Regulations Lies In The Court of Appeals

Judicial review of "effluent limitations guidelines" is conferred on the courts of appeals by section 509(b)(1)(E) of the Act, which applies to "Review of the Administrator's action . . . in approving or promulgating any effluent limitation or other limitation under section 301. . . ." Although the Administrator is not empowered by section 301 to issue effluent limitations, he in fact did so and the courts of appeals have jurisdiction to determine whether he acted within his statutory authority.

Moreover, the Administrator also relied upon section 304(b). This reliance is another source of jurisdiction in the courts of appeals. Section 509(b)(1(E) does not expressly refer to section 304(b), but it does refer to section 301(b) which expressly incorporates section 304(b). Since the promulgation of section 304(b) guidelines is a major national regulatory action under the permit program, the most logical reading of the Act is that judicial review of section 304(b) guidelines lies in the court of appeals because other similar actions, and actions based on the guidelines, are reviewed there. The importance of guidelines supports the interpretation that the above-quoted references to section 301 incorporates the section 304(b) guidelines.

[1] Petition for Certiorari (January 9, 1976) at 17.

[2] 33 U.S.C. § 1251 *et seq.* (Supp. II 1972). References herein to the Act will refer to sections of the Act itself, rather than to the corresponding sections in the United States Code.

[3] The written consents are filed herewith.

Furthermore, the court of appeals below had pendent jurisdiction to review the regulations while reviewing challenges to the accompanying new source performance standards for the same industry. These standards were based on the same administrative record from which the regulations for existing sources were formulated.

B. The Administrator Is Not Authorized To Issue Single-Number Effluent Limitations

Section 301 of the Act does not grant to the Administrator the power to promulgate effluent limitations. The absence of an express grant of power is significant because when Congress wanted the Administrator to establish limitations of any sort under the Act, it expressly commanded him to do so and also specified the timetable and procedures to be followed.

Power in the Administrator to issue rigid single-number effluent limitations should not be implied because that power would upset the Federal-State relationship conceived by Congress. Section 101(b) of the Act expresses Congress' goal of placing the "primary responsibilities" to control water pollution with the

States. This goal was to be carried out by empowering the Administrator to issue "precise" national *guidelines* for the permit grantors to apply to individual plants under the Act's permit program. These guidelines were intended to provide meaningful guidance to the permit grantors, enabling them to deal with the innumerable differences that exist among plants in a nationally uniform way. Congress intended the permit programs to be "uniform" in treating *similar* plants in a *similar* way. This process requires the permit grantors to recognize significant differences among diverse plants, not ignore them. In one fell swoop the Administrator has issued single-number effluent limitations which reduce the permit grantors to helpless scriveners and give them no guidance on how to deal with industrial diversity on a nationally uniform basis. The Administrator exceeded his statutory authority when he issued these regulations.

However if any power relating to effluent limitations is to be found under section 301, it must be found by implication rather than by express statutory language. If any such implied power is to be found in section 301, it should not be the power claimed by the Administrator, which would have the effect of destroying the express logic and scheme of the remainder of the Act.

C. The Administrator Has Evaded His Duty To Publish Section 304(b) Guidelines

While claiming implied authority to issue limitations under section 301, the Administrator has simultaneously ignored the express statutory command of Congress to "publish . . . regulations providing *guidelines* for effluent limitations . . ." Section 304(b).[4] The Ad-

[4] All emphasis herein has been supplied unless otherwise indicated.

ministrator's interpretation of the Act leaves no room for such guidelines. Yet the legislative history of the Act shows that Congress intended the guidelines to provide nationally applicable ranges of effluent limitations for categories within industries. The guidelines were also supposed to provide guidance to the permit grantors on how to determine where within the range the limitations for a particular plant should fall.

The Administrator has publicly admitted that Congress intended differences among plants within a category to be recognized in the permit program. However, his make-shift attempt to implement this objective through a limited "variance clause" does not comply with the Act. The "variance clause" provides no guidance to the permit grantors on how to adjust effluent limitations in light of differences among plants within a category or subcategory. In fact, it gives no guidance whatever. Instead, it establishes a norm of rigid adherence to the Adminstrator's single-number effluent limitations and an exception for plants which are "fundamentally different." But the Administrator does not explain what makes a plant "fundamentally different" nor what criteria a permit grantor should use to apply effluent limitations to such a plant. Thus the "variance clause" does not remedy the Administrator's failure to comply with his duty to publish guidelines under section 304(b) of the Act.

ARGUMENT

I.

JURISDICTION TO REVIEW THESE REGULATIONS LIES IN THE FEDERAL CIRCUIT COURTS OF APPEALS UNDER SECTION 509(b)(1)(E) OF THE ACT.

On March 12, 1974, EPA promulgated "effluent limitations guidelines for existing sources and standards

of performance for new sources for the inorganic chemicals manufacturing point source category. 39 Fed. Reg. 9612 (March 12, 1974). Amicus submits that section 509(b)(1)(E) of the Act confers original jurisdiction on the courts of appeals to review the "effluent limitations guidelines."[5] This grant of jurisdiction is exclusive. *Whitney Nat'l Bank* v. *Bank of New Orleans and Trust Co.*, 379 U.S. 411, 420-22 (1965).

Section 509(b)(1) provides:

> (b)(1) *Review of the Administrator's action* (A) in promulgating any standard of performance under section 306, (B) in making any determination pursuant to section 306(b)(1)(C), (C) in promulgating any effluent standard, prohibition, or treatment standard under section 307, (D) in making any determination as to a State permit program submitted under section 402(b), (E) *in approving or promulgating any effluent limitation or other limitation under section 301, 302, or 306,* and (F) in issuing or denying any permit under section 402, may be had by any interested person in the Circuit Court of Appeals of the United States for the Federal judicial district in which such person resides or transacts such business upon application by such person. Any such application shall be made within ninety days from the date of such determination, approval, promulgation, issuance or denial, or after such date only if such application is based solely on grounds which arose after such ninetieth day.

[5] There is no dispute concerning the jurisdiction of the courts of appeals to review standards of performance for new sources issued under section 306 of the Act. Jurisdiction to review such regulations is conferred by section 509(b)(1)(A).

A. Jurisdiction Lies In The Courts Of Appeals Under Section 509 (b)(1)(E) Because, Rightly Or Wrongly, The Administrator In Fact Issued Effluent Limitations Relying Upon Section 301 For His Authority.

The Administrator at the time of promulgation purported to rely upon section 301 for the authority to issue these regulations. 39 Fed. Reg. 9612 (March 12, 1974). He has consistently thereafter maintained that these regulations, which are effluent limitations, were issued under section 301. The Administrator advanced this position before the district court and court of appeals below.[6]

This reliance has jurisdictional significance. Section 509(b)(1)(E) confers jurisdiction on the courts of appeals over "the Administrator's action . . . in approving or promulgating any effluent limitation under section 301 . . ." Because the Administrator in fact acted under his alleged authority under section 301 and in fact promulgated "effluent limitations" thereunder, the court of appeals had jurisdiction to determine whether the Administrator's action was proper or improper. See *The Fair v. Kohler Die & Specialty Co.*, 228 U.S. 22 (1913). Amicus thus agrees with the conclusions of the Fourth and Tenth Circuits that a court need not reach the merits of the Administrator's action in order to decide the preliminary question of jurisdiction. *DuPont v. Train,* 528 F.2d 1136, 1141 (4th Cir. 1975); *American Petroleum Institute v. Train,* 526 F.2d 1343 (10th Cir. 1975). The court in the *American Petroleum Institute* case explained:

> API says that the court of appeals does not have jurisdiction because the Act does not author-

[6] *DuPont v. Train,* 383 F. Supp. 1244, 1250 (W.D. Va. 1974), *affirmed,* 528 F.2d 1136 (4th Cir. 1975).

ize the Administrator to promulgate § 301 regulations imposing effluent limitations on existing sources. The argument is beside the point because *the Administrator has not only claimed the power but also has acted to promulgate regulations under § 301.* Our present concern is with the jurisdiction of the court of appeals—not with the statutory authority of the Administrator.

. . . The validity or invalidity of [EPA's] action has no bearing on jurisdiction. *In the exercise of its statutory jurisdiction, the court determines whether the Administrator acted within his statutory authority. American Petroleum Institute v. Train,* 526 F.2d at 1345.

B. Original Jurisdiction Lies In The Courts Of Appeals Because Section 304(b) Is Incorporated By Section 301 Into Section 509(b)(1)(E).

The Administrator also relies upon section 304(b) for the authority to issue these regulations. Section 304(b) is not expressly mentioned in section 509(b). However, Amicus submits that actions under section 304(b) are reviewable per se in the courts of appeals because the reference in section 509(b)(1)(E) to "the Administrator's action . . . in approving or promulgating any effluent limitation . . . under section 301" necessarily includes the major step of issuing guidelines under section 304(b). Section 301(b)(1)(A) requires the achievement of effluent limitations by 1977 "defined by the Administrator pursuant to section 304(b) of this Act" and section 301(b)(2)(A) requires the achievement of effluent limitations by 1983 "in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act."

Thus the goals of section 301(b) are merely vague exhortations until the Administrator gives them pre-

cise meaning by issuing section 304(b) guidelines. The issuance of the guidelines is a major action, national in scope, taken to implement the goals of section 301. It is entirely appropriate for such important national action to be reviewed in the courts of appeals. Since section 509(b)(1)(E) provides for expeditious review of subsequent administrative actions based on the guidelines, Congress must have intended that there would be expeditious review of the guidelines themselves. That section 301 incorporates section 304 for the purposes of judicial review is the most logical reading of the Act.

C. The Promulgation Of Section 304(b) Guidelines Is A Major Regulatory Action Under The Permit Program And Therefore Is Reviewable In The Courts Of Appeals.

Section 509(b) was intended to provide for prompt review in the courts of appeals of all important actions taken by the Administrator in issuing regulations applied under the permit program, in addition to the issuance of the permits themselves. The issuance of section 304(b) guidelines is a significant action *in and of itself* because the Administrator must veto permits which are outside the section 304(b) guidelines. Section 402(d)(2)(B).[7]

Secondly, in cases where the Administrator himself is in charge of the permit program, the effluent limitations must comply with the command of section 301(b) to require the achievement of "best practicable" or "best available" technology *as defined by the guide-*

[7] The reference in section 402(d)(2)(B) is to the guidelines under section 304(b), as opposed to the general State permit program guidelines under section 304(h) which are applied to the permit program in section 402(c)(2).

lines. In both instances, the issuance of guidelines is an essential part of the Administrator's "action . . . under section 301." Moreover, since section 301 expressly incorporates the Administrator's action under section 304(b), it is logical to read section 509(b)(1)(E) as also incorporating the section 304(b) guidelines.

This interpretation of section 509(b)(1)(E) is confirmed by a review of the general scheme for judicial review established by Congress under the Act. Congress established a dichotomy between enforcement actions, which are brought in the district courts (§§ 309, 505), and review of the Administrator's regulatory actions under the permit program, which are brought in the courts of appeals under section 509(b)(1). Section 301(b) incorporates section 304(b), so the Administrator's action under the latter section should be reviewed in the courts of appeals under section 509(b)(1)(E). As the court of appeals below pointed out, "it is highly significant that the [congressional] committee reports [on the Act] make no mention of any division of judicial review" which would relegate review of the Administrator's guidelines to the district courts while new source performance standards are reviewed in the courts of appeals. *DuPont* v. *Train,* 528 F.2d at 1141 (4th Cir. 1975).

D. Because Section 306 New Source Performance Standards Must Be Reviewed In The Courts Of Appeals, Those Courts Also Have Pendant Jurisdiction To Review Section 304(b) Guidelines Issued Simultaneously With The Performance Standards.

The "effluent limitations guidelines" at issue here were promulgated simultaneously with new source performance standards under section 306 of the Act. 39 Fed. Reg. 9612 (March 12, 1974). These two sets of

regulations were issued simultaneously, apply to plants in the same point source category, and are based upon a single set of studies of the effluent treatment methods applicable to that category. The court of appeals had jurisdiction to review the new source performance standards under section 509(b)(1)(A). Because the issuance of those standards was so intimately related to the issuance of the "effluent limitations guidelines," the court of appeals also had pendant jurisdiction over these "effluent limitations guidelines."

This court has expressed its disapproval of bifurcated judicial review of closely-related agency actions. *Foti v. Immigration and Naturalization Service,* 375 U.S. 217 (1963). See also *Oljato Chapter of Navajo Tribe v. Train,* 515 F.2d 654, 660 (D.C. Cir. 1975); *Tomah-Mauston Broadcasting Co. v. FCC,* 306 F.2d 811 (D.C. Cir. 1962); Jaffe, *Judicial Control of Administrative Action,* at 158-59 (1965); Note, *Jurisdiction to Review Federal Administrative Action: District Court or Court of Appeals,* 88 Harv. L. Rev. 980, 999 (1975). Here, bifurcation would require two different courts to study essentially the same record and would pose the risk of inconsistent adjudication of essentially identical technical issues. The new source performance standards were based upon the same study which generated the regulations for existing sources. For most categories the limitations for existing point sources are identical to the new source performance standards for corresponding subcategories. The independent discussion of new source performance standards required less than four pages of the Administrator's Development Document for this category.[8] New source per-

[8] Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Major Inorganic Prod-

formance standards for the steel industry were developed on a similar basis.[9] Yet under a system of bifurcated review, the owner of an existing source which expanded after the publication of proposed new source performance standards would be forced to proceed both in the court of appeals (for its new operations) and the district court (for its old operations) in order to challenge the action of the Administrator.

The policy against bifurcation of review of administrative actions is itself reason to interpret section 301(b) as incorporating section 304(b) for the purposes of judicial review. *Foti, supra; Oljato, supra.* But aside from that approach, which Amicus favors, the court of appeals had pendant jurisdiction to review the "effluent limitations guidelines" in the same action in which it reviewed the related section 306 new source performance standard under jurisdiction conferred by section 509(b)(1)(A).

The test for pendant jurisdiction was liberalized by the Court in *United Mine Workers v. Gibbs,* 383 U.S. 715 (1966). In *Gibbs,* the Court explained that in a case where a court has jurisdiction over a federal claim but also is presented with a claim under state law, the federal claim must independently confer subject matter jurisdiction on the federal court. In addition, the state and federal claim must derive from a common nucleus of operative fact. The Court concluded:

ucts Segment of the Inorganic Chemicals Manufacturing Point Source Category, EPA-440/1-74-007-a (March, 1974), pages 339-343 (Ex. R. 5918-5921).

[9] Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Steelmaking Segment of the Iron and Steel Manufacturing Point Source Category, EPA-440/1-74-024-a (June, 1974).

> But if, considered without regard to their federal or state character, a plaintiff's claims are such that he would ordinarily be expected to try them all in one judicial proceeding, then, assuming substantiality of the federal issues, there is *power* in federal courts to hear the whole. 383 U.S. at 725. (emphasis in original.)

Here, it is obviously appropriate to review these closely-related regulations in a single judicial proceeding. Both sets of regulations are based on essentially the same factual record.

The doctrine of pendant jurisdiction applies with even more force to favor consolidation of claims which would otherwise be heard in different courts within the federal juricial system as is the case here. See *Florida Lime and Avocado Growers, Inc. v. Jacobsen,* 362 U.S. 73 (1960) and *Romero v. International Terminal Operating Co.,* 358 U.S. 354, 380-81 (1959) (referring to the test for pendant jurisdiction established in *Hurn v. Oursler* [289 U.S. 238 (1933)], which was later superseded and liberalized in *Gibbs, supra.*)

In short, it is perfectly appropriate for these regulations to be reviewed together in the court of appeals under the doctrine of pendant jurisdiction. The same policy considerations which prompted that doctrine also underlie the policy expressed by the Court against bifurcation of review of administrative actions. The "effluent limitations guidelines" are so closely related to the new source performance standards issued simultaneously with them that under either theory both should be reviewed together in the court of appeals.

II.

SECTION 301 CONTAINS NO EXPRESS POWER TO ISSUE MANDATORY SINGLE-NUMBER EFFLUENT LIMITATIONS, AND POWER TO PERFORM SO IMPORTANT A FUNCTION SHOULD NOT BE IMPLIED.

Section 301 contains no express grant of power to the Administrator to promulgate effluent limitations of any sort, much less the power to issue inflexible single number effluent limitations controlling in all permits as claimed by the Administrator. Rather, what subsection 301(a) literally does is make unlawful any discharge which does not comply with "this section and sections 302, 306, 307, 318, 402, and 404 of this Act." Subsection 301(b) sets 1977 and 1983 deadlines for *achieving* various effluent limitations, but all of them, however, are *established* pursuant to other enumerated sections of the Act. For example, effluent limitations "established pursuant to any State law or regulations," (§ 301(b)(1)(C)), are promulgated by the several states, not by the Administrator. Effluent limitations implementing water quality standards, (§ 301(b)(1)(C)), are established under section 302, not section 301. Pre-treatment standards (referred to in §§ 301(b)(1)(A) and 301(b)(2)(A)) are established under section 307.

A comparison of section 301 with numerous other sections of the Act demonstrates that when Congress intended to require or empower the Administrator to establish limitations of any type Congress made the requirement or grant explicit.[10] The absence of explicit language in section 301 indicates strongly that Congress did not intend the Administrator to promulgate limitations under section 301. Moreover, unlike the numerous other sections of the Act which do require and empower the Administrator's action, section 301 fails to outline any procedure, or time period or deadline, within which effluent limitations (as opposed to § 304(b) guidelines) should or must be established. It is inconceivable that, if Congress really did intend the Administrator to have the power to issue national single-number discharge limitations applicable to all existing point sources by regulation under section 301, it would leave the time and procedure therefore completely vague, while discharge limitations of limited applicability and much less import were by *explicit* statutory language made subject to strict timetables and procedures, e.g., sections 307(a)(2) and 307(b).

[10] Sections 302(a), 303(b), 303(c), 306(b), 307(a), 307(b), 307(c) and 312(b)(1) explicitly require the Administrator to "establish effluent limitations" or to "publish" or "promulgate" limitations or standards. Sections 304(a)(1), 304(a)(2), 304(b), 304(c), 304(d), 304(f), 304(g), 304(h), 307(a)(1), 311(b)(2)(A), 311(b)(4), 311(j) and 403(c) explicitly require the Administrator to "publish," "issue," "promulgate" or "establish" guidelines, regulations, information, criteria or lists.

That the Administrator has no power under section 301 to issue single-number effluent limitations is wholly understandable in light of the history of the Act. The basic issue with respect to such power is whether the Act was intended to accomplish federal pre-emption of the authority of the several States over effluent limitations in specific permits. The Act was passed in 1972 in a context which has been largely ignored.

The story is to be found in the archives of the Court. In 1970 Congressman Reuss of Wisconsin suggested that the Rivers and Harbors Act of 1899, which

had been the keystone of regulation of physical encroachments into the navigable waters of the United States for 71 years, might conceivably be broad enough to be used as a vehicle for control of the discharge of pollutants into navigable waters. Adventitious efforts to so use the 1899 Act ran into vigorous resistance in the courts. An attempt was made by Presidential proclamation to legitimatize the extension of the 1899 Act to control pollution. In that proclamation the President purported on his own authority to set up a permit program under the 1899 Act, but that program was promptly stymied by the effect of a case in the District of Columbia District Court (*Kalur v. Resor,* 335 F. Supp. 1 D.D.C. 1971)) and a case in the Third Circuit (*United States v. Pennsylvania Industrial Chemical Corporation,* 329 F. Supp. 1118 (W.D. Pa. 1971) *reversed,* 461 F.2d 468 (3d Cir. 1972), *reversed in part,* 411 U.S. 655 (1973)).

In this context the Act was pushed through Congress as an amendment to the existing Water Pollution Control Act. The basic scheme of the Act, in the light of past history (and the explicit statutory language of the statute of which the Act was an amendment) was to create as the control mechanism for water pollution a permit program in terms of specific effluent limitations—a significant policy change from prior legislation which had focused on stream quality.

Under the Act the permit program was to be administered principally by the several States. The role of the federal government was to provide guidelines (under § 304) for the States to use in their permit programs. This statutory scheme recognized that the federal government was in a better position than any individual State to determine what constitutes "best

practicable" or "best available" technology throughout the United States. Finally, the federal government had the responsibility to establish New Source Performance Standards on a national basis to prevent forum shopping by industries.

One of the expressly stated principal policies of the Act is to preserve the primacy of the States in water pollution control:

> It is the policy of Congress to recognize, preserve, and protect the *primary* responsibilities and rights of States to prevent, reduce, and eliminate pollution . . . .
> Section 101(b).

That policy was *not* changed by any provision of the Act.

The Congressional debates on the Act explain this affirmation of State primacy. Congressman Blatnik, Chairman of the House Public Works Committee, set forth the position of that Committee on the issue forcefully:

> An effective water pollution control program must have significant participation at the regional and local level. Your committee believes that the majority of the program must be handled at that level of government which is *sufficiently close to the problems* to recognize them and to determine what is best for the waterway and area concerned. Obviously, these local and regional efforts must be within the framework and goals set out by Congress. However, let us not kid ourselves that the Federal establishment operating by itself can implement an effective water quality program. *Unless we have meaningful local and State participation and not a Federal dictatorship, the*

program will founder on the rocks of the generally inflexible. Washington dictated approach. Local and State initiative will disappear. *Those with the most incentive to work for local, State, and regional water quality will be stifled by Federal rigidity. We must not let this happen. We must preserve this local and State initiative.* 118 Cong. Rec. 10206 (1972), 1 Leg. Hist. 355.[11]

The historical perspective and the legislatively intended pre-eminent role of the States are in fundamental conflict with any contention that Congress intended by indirection or implication through section 301 to pre-empt for the federal authorities the power to set effluent limitations in permits. This is reinforced by a consideration of the overall logic and scheme of the Act. As stated by the Senate Committee on Public Works:

> Subsection (b) of this section [304] requires the Administrator, within one year after enactment, to publish *guidelines for setting effluent limitations reflecting the mandate of section 301, which will be imposed as conditions of permits issued under section 402.* These guidelines would identify what constituted the "best practical control technology currently available" and the "best available control measures and practices," and the degree of effluent reduction obtainable through the application of each. Thus, these guidelines would define the effluent limitations required by

[11] Additional recognition of the role of the States is found in the legislative history at 118 Cong. Rec. 10209, 10214, 10234 (1972), reprinted at pages 363, 377, 426-427 of the two-volume Committee Print entitled *A Legislative History of the Water Pollution Control Act Amendments of 1972,* 93d Cong. 1st Sess. (Committee Print 1973, herein "Leg. Hist.") 117 Cong. Rec. 38805 (1971), 2 Leg. Hist. 1272.

> the first and second phases of the program established under section 301. S. Rep. No. 92-414, 92d Cong., 1st Sess. 51 (1971); 2 Leg. Hist. 1469.

If it had been intended by Congress that the Administrator should establish the effluent limitations under section 301, there would have been no point in requiring the Administrator to "publish guidelines" for setting effluent limitations. It is incredible that the Administrator would be required publicly to instruct himself as to how to set effluent limitations. Obviously section 304 guidelines were intended to be addressed to the permit grantors, who were to set the effluent limitations in the section 402 permits. This interpretation is confirmed by a review of section 402(d)(2)(B), which empowers the Administrator to veto a State-issued permit which is "outside the *guidelines* . . ." of this Act.

In answering a question during Senate debate, Senator Muskie confirmed that individual effluent limitations were to be established under the section 402 permit process:

> Mr. Mathias. Does section 301(b)(2)(A) on page 76 contemplate that a State, or the Administrator if appropriate, might be able to *set the 1981 [now 1983] effluent limitations almost on an individual point source by point source basis?*
>
> Mr. Muskie. Section 301(b)(2)(A) as well as section 301(b)(1) *anticipate individual application of controls on point sources* through the procedures *under the permit program established under section 402.* 117 Cong. Rec. 38855 (1971), 2 Leg. Hist. 1391.

The establishment of effluent limitations by the permit grantor appropriately implements the overall

congressional policy. As stated by the Senate Committee:

> The program proposed by this Section [301] will be implemented through permits issued in Section 402. S. Rep. 92-414, 92d Cong. 1st Sess. 42 (1971); 2 Leg. Hist. 1460.

The Committee also indicated that the limitations would be established in the permit process rather than by regulations which fix rigid numbers for all point sources within a subcategory. The Committee stated that:

> . . . little has been done to identify for industry the exact meaning, on a plant-by-plant basis, of the equivalent of secondary treatment. *Through the permit program established under section 402, with the help of those States which have effective programs, the Administrator and the States can and should,* by mid-1983, *be able to apply specific effluent limitations for each industrial source.* S. Rep. No. 92-414, 92d Cong. 1st Sess. 44 (1971); 2 Leg. Hist. 1462.

In response to contentions of all segments of industry that specific effluent limitations for each plant are to be established not by the Administrator pursuant to section 301, but rather by the permit grantors under section 402 on an individual basis, the Administrator has argued that such an interpretation of the Act would be inconsistent with the supposed goal of "uniformity" of regulation. However, as noted by the Conference Committee:

> Except as provided in section 301(c) of this Act, the intent of the Conferees is that effluent limitations applicable to individual point sources within a given category or class be as uniform as possible. The Administrator is expected to be *precise in his guidelines* under subsection (b) of this section [§ 304], so as to assure that *similar* point sources with *similar* characteristics, regardless of their location or the nature of the water into which the discharge is made, will meet *similar* effluent limitations. S. Rep. No. 92-1236, 92d Cong. 2d Sess. 126 (1972); 1 Leg. Hist. 309.

Two things are to be noted from the quoted passage. First, the "uniformity" required by the Act is that *similar* point sources meet *similar* effluent limitations, not that all sources, like and unlike, meet identical limitations. The effluent limitations "*within* a given category or class" are to be "*similar*" and "as uniform *as possible,*" not the *same,* as would result from mechanical application by permit grantors of a single-number limitation etched in stone by the Administrator.[12] Second, this uniformity is to be the result of the requirement that the Administrator "be precise in his guidelines" under section 304(b), not of an expectation that he set rigid single-number limitations under section 301, with a mandate that they be mechanically applied in all permits.

By employing "precise" section 304(b) guidelines and section 304(b) factors, permit grantors would produce uniformity consistent with the Fifth Amendment.[13] This was to be achieved by assigning to each point source having similar section 304(b) character-

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[12] Webster defines the word "same" as resembling in every way and conforming in every respect, as opposed to its definition of "similar" which is defined as having characteristics in common. Webster's Third New International Dictionary (3d Ed. 1961).

[13] See *Natural Resources Defense Council v. EPA,* —— F.2d ——, 8 E.R.C. 1988, 1992 (2d Cir. 1976).

istics a similar numerical limitation from within the guideline "range." (See Part III, *infra.*)

If the Administrator had fulfilled the command of the Act under section 304(b), the section 304(b) guidelines would provide an opportunity for the required flexibility, account for differences between plants within a subcategory, and would at the same time constitute workable instructions to the permit grantors so that there would be uniformity of application among plants with similar characteristics. This is the uniformity contemplated by Congress and it is the natural result of properly drawn guidelines. The *intended* uniformity cannot be achieved under the Administrator's interpretation of section 301. His interpretation produces limitations which apply regardless of dissimilarities among point sources.

The Second Circuit in its recent decision in *NRDC v. EPA*, —— F.2d ——, 8 E.R.C. 1988, 1992 (2d Cir. 1976), a companion case to *Hooker Chemicals and Plastics Corp. et al v. Train*, —— F.2d ——, 8 E.R.C. 1961 (2d Cir. 1976), put its finger on the matter of the need for flexibility when it said, ". . . without variance flexibility, the program might well founder on the rocks of illegality." The word "variance" could well be omitted—the crucial point is that Congress chose to regulate through a permit program, and the permit program obviously must balance the needs and problems of individual point sources against the broad objectives of the Act in arriving at a constitutionally acceptable regulatory program. In interpreting the Act, the courts of appeals which have considered the matter have recognized that a cornerstone of the Act is the principal that flexibility lies in the per-

mit grantor's determinations. The opinions of the Third, Fourth, Seventh, Eighth and District of Columbia Circuits acknowledge the necessity and desirability of such flexibility.[14] Indeed, there is really no controversy on the subject since the Administrator has admitted during the course of his regulatory efforts that flexibility in the permit grantor is necessary.[15]

In light of the historical perspective, the intended primary role of the States and, most importantly, the overall logic and scheme of the Act, it is possible to understand what section 301 does and does not do. First, it establishes that water pollution is to be controlled by reference to "effluent limitations," rather than stream quality. Secondly, section 301 requires all sources to "achieve effluent limitations" (i.e., to meet permit requirements) that require application (for 1977) of "best practicable control technology currently

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[14] Third Circuit: *AISI v. EPA, supra*, 526 F.2d 1027, 1044-46 (3d Cir. 1975); Fourth Circuit: *DuPont v. Train*, —— F.2d ——, 8 E.R.C. 1718, 1722 (4th Cir. 1976); Seventh Circuit: *American Meat Institute v. EPA*, 526 F.2d 442, 449 (7th Cir. 1975); Eighth Circuit: *CPC International, Inc. v. Train*, 515 F. 2d 1032 (8th Cir. 1975); District of Columbia Circuit: *American Frozen Food Institute v. Train*, —— F.2d ——, 8 E.R.C. 1993, 2017-18 (D.C. Cir. 1976.

[15] "Section 304(b)(1)(B) of the Act provides for 'guidelines' to implement the uniform national standards of section 301(b)(1)(A). Thus, *Congress recognized that some flexibility was necessary in order to take into account the complexity of the industrial world with respect to the practicability of pollution control technology. In conformity with the Congressional intent and in recognition of the possible failure of these regulations to account for all factors bearing on the practicability of control technology,* it was concluded that *some provision was needed to authorize flexibility in the strict application of the limitations contained in the regulation where required by special circumstances applicable to individual dischargers.*" 39 Fed. Reg. 24117 (June 28, 1974).

available" and (for 1983) of "best available control technology economically achievable."

Section 301 sets forth the general goal for all permits under section 402 and establishes times for achievement of those goals. Section 304 guidelines are intended to be the principal expression of federal responsibility with reference to effluent limitations. The establishment by the permit grantor, rather than by a distant federal office, of the actual limitation numbers to control a given point source is the means by which Congress intended the policy of State primacy to be implemented in the Act.

The Administrator has asserted a power under section 301 to promulgate national, single-number effluent limitations which appear in the permit of each point source within a given industrial subcategory. If the Court should validate this usurpation of power to promulgate actual permit numbers, the intended role of the States in administering the Act will be destroyed. Such crucial power should not be implied "by a series of subtle inferences, rather than by reference to clear statutory language," as Judge Adams so cogently observed in his concurring opinion in *AISI v. EPA,* 526 F.2d 1027, 1073 (3d Cir. 1975).

Because of the extreme importance of the power claimed by the Administrator, Amicus urges that if the Court perceives in section 301 any implied grant of power to the Administrator, it recognize it not as the controlling power over permit numbers claimed by the Administrator but, at most, the power to promulgate base level numbers which define the lower limit of the range of guideline numbers required by section 304(b). If *any* power relating to effluent limitations is to be

implied from section 301, it must be a power which is compatible with the express mandate of Congress in section 304(b) rather than a power which would nullify section 304(b). The essential principles of flexibility and State primacy in the permit process are destroyed if the Administrator issues rigid, single-number effluent limitations. A power implied from section 301 should not be allowed to destroy the scheme of the Act.

III.

THE ADMINISTRATOR MUST ESTABLISH RANGES OF PERMISSIBLE EFFLUENT LIMITATIONS FOR CLASSES AND CATEGORIES OF EXISTING POINT SOURCES AS PART OF THE GUIDELINES REQUIRED BY SECTION 304(b) OF THE ACT.

Amicus submits that the Act requires that the "degree of effluent reduction attainable" be expressed in the section 304(b) guidelines as a permissible "range" of effluent limitations to be achieved by 1977 and 1983 by all plants. In establishing ranges, the Administrator must consider the factors enumerated in section 304(b) (age, economic impact, size, etc.). The effluent limitation within the range applicable to an individual point source is determined by the permit grantor under section 402 by taking into account the factors enumerated in section 304, in addition to other factors which likewise *must be specified* in the section 304(b) guidelines. The range concept is pivotal to the proper functioning of sections 301, 304 and 402 of the Act. The purpose of the permit program is to apply the section 304 guidelines to the specific characteristics of an individual point source to determine the precise effluent limitation which it must achieve. Congress did not intend that the permit grantor perfunctorily recopy into permits rigid single

number effluent limitations determined in Washington by the Administrator.

The purpose of requiring the Administrator to provide a range of effluent limitations is the same as the purpose in requiring him to specify factors: to allow the permit grantors to consider and give effect to the specific characteristics and circumstances of an existing point source. Such intent is underscored by Congress' treatment of new sources in section 306 of the Act. With respect to new sources, the Act provides for the establishment of new source performance *standards* rather than effluent limitation *guidelines* because it was felt new sources could be constructed to meet a given standard and would not be encumbered by the varying problems and circumstances of the older existing point sources. On the other hand, the congressional intent as to existing point sources has been completely thwarted by the Administrator's so-called "effluent limitations guidelines" which, by their failure to provide ranges and specify factors, actually give the permit grantor no guidance or flexibility whatever.

The key role of the range concept in the regulatory scheme is readily discernible from the Act's legislative history. Congress intended that the Administrator establish a range of 1977 values for "best practicable control technology currently available" for a category or class of point sources. The Senate Report explains:

> In effect, for any industrial category, the Committee expects the Administrator to define a range of discharge levels, above a certain base level applicable to all plants within that category. . . .
>
> * * *
>
> The Administrator should establish the range of best practicable levels based upon the average of

> the best existing performance by plants of various sizes, ages, and unit processes within each industrial category. S. Rep. No. 92-414, 92d Cong., 1st Sess. 50 (1971); 2 Leg. Hist. 1468.

The summary of the Act prepared by Senator Muskie reiterates this intention:

> The Administrator should establish the range of best practicable levels based upon the average of the best existing performance by plants of various sizes, ages, and unit processes within each industrial category. 118 Cong. Rec. S16873 (daily ed., October 4, 1972); 1 Leg. Hist. 169 (summary of Act prepared by Senator Muskie).

Congress intended that the guidelines defining "best available" technology for 1983 also provide a range of values:

> . . . the Committee intends that effluent limitations be based upon application of best available technology as defined by the Administrator. In making the determination of "best available" the Committee expects the Administrator to apply the same principles involved in making the determination of best practicable as outlined above except that rather than the range of levels established in reference to the average of the best performers in an industrial category the range should at a minimum be referenced to the best performer in any industrial category. S. Rep. No. 92-414, 92d Cong., 1st Sess. 50 (1971); 2 Leg. Hist. 1468.

The range requirement was expressly recognized by the Third Circuit in *AISI v. EPA,* 526 F.2d 1027, 1046 (3d Cir. 1975). The court in that case held that Congress intended that a range of effluent limitations be established and on remand directed the Administra-

tor to develop a range in its regulations for the Iron and Steel Manufacturing Point Source Category. The court's concern was to resolve the congressional concern for uniformity with its desire for localized (State) discretion in considering plant characteristics when establishing effluent limitations for a particular plant. The Third Circuit held that any single-number section 301 effluent limitation[16] must represent a "base level" applicable to all plants within a category or subcategory, and that a range must be established as a basis for action by permit grantors in setting more stringent limitations as to any particular plant.

The view of the Third Circuit, which is consistent with the logic of the Act, is that under section 304(b) the Administrator must establish effluent limitation guidelines applicable to classes and categories of point sources in the following manner. The Administrator should first subcategorize each industry.[17] He then

[16] Amicus submits that the Administrator has no power under section 301 to issue single-number effluent limitations. See Part II, *supra*.

[17] Subcategorization itself does not provide the necessary range inasmuch as the Administrator generally has subcategorized industry along process lines. The Third Circuit in addressing this subject stated:

> Finally, we disagree with the Administrator's contention that 'sub-categorization' provides a range. The Administrator's subcategorization merely divided the entire iron and steel making industry by means of the types of processes employed, and *it does not reflect any of the innumerable differences within the particular subcategories.* No guidance is given with respect to the remaining section 304(b) factors, such as age, costs and engineering aspects, which we previously concluded must be "specified" in order to guide the permit grantors in exercising their carefully circumscribed discretion in setting precise standards for individual point sources. 526 F.2d at 1046.

must apply the factors enumerated in section 304(b) to each subcategory to determine a base level of "best practicable control technology currently available" as well as establish a range of effluent limitations above the base level.[18] Both the range and base level are to be determined by studying the innumerable differences among plants within each subcategory. He must then specify in the guidelines the factors which the permit grantor must consider and which will accommodate those innumerable differences.

The precise effluent limitations applicable to an individual plant are to be determined in the section 402 permit program. In applying the guidelines to that plant, the permit grantor must take into account the section 304(b) factors to determine the level within the range where the plant falls. The Fourth Circuit recognized that the enumerated section 304(b) factors must be applied to a particular plant in addition to being considered when establishing the range when it stated:

> With regard to the 1977 step, the reference in §301(b)(2)(A) to "point sources" is taken to mean that Congress intended that the permit grantor should give individual attention to each "point source" and apply the factors specified in §304(b)(1)(B). *Some of those factors, e.g., "age* of equipment and facilities involved" can only be applied on an individual basis. EPA recognized this problem when it included variance provisions in its regulations for the 1977 step. *E. I. DuPont de Nemours & Company v. Train*, —— F.2d ——, 8 E.R.C. 1718, 1723 (4th Cir. 1976).

[18] This general scheme must be repeated in order to develop guidelines defining "best available technology economically achievable" for 1983.

Amicus is mindful of Senator Muskie's assertion that the section 304(b) factors should not be considered on a plant-by-plant basis.[19] Amicus disagrees with that assertion because certain of the section 304(b) factors can be properly applied only on a plant-by-plant basis, as was recognized by the Fourth Circuit, *supra*.

The Third Circuit's interpretation of the Act as to the range concept under section 304 provides both the uniformity and flexibility required by the Act and intended by Congress. The Administrator has heretofore recognized the need for flexibility in its otherwise rigid effluent limitations and has attempted to provide that flexibility by means of a variance provision.

IV.

THE VARIANCE PROVISION FAILS TO PROVIDE FLEXIBILITY BECAUSE IT DOES NOT REQUIRE INDIVIDUAL APPLICATION OF THE SECTION 304(b) FACTORS IN THE PERMIT PROCESS.

No one disagrees that the Act requires flexibility to accomplish fundamental fairness in application. The question is whether the Administrator's "variance" provision does so in a manner consistent with the stated objectives of the Act.

The Administrator's proposal premises the grant of a variance on the existence of "fundamentally different" factors. 39 Fed. Reg. 9622 (March 12, 1974).

This identical provision was set aside and remanded in *AISI v. EPA,* 526 F.2d 1027, 1046 (3rd Cir. 1075), where the court said:

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[19] See 118 Cong. Rec. S16873 (Daily ed., October 4, 1972); 1 Leg. Hist. 172.

> The Administrator contends that sufficient flexibility in the regulations is provided through the "variance" procedure, which allows individual discharges to obtain variances from the limitations upon a showing that the factors relevant to a particular point source are "*fundamentally different* from the factors considered in the establishment of the guidelines." Our responsibility, however, is not to determine whether the Administrator has provided for flexibility, but whether he has followed the statutory scheme established by Congress. Regardless of whether the establishment of a variance procedure is within the Administrator's discretion, we do not believe that the Administrator can ignore his obligation to promulgate guidelines specifying factors to be considered and ranges above a base level. We also note that the variance procedure provides for less flexibility than we believe Congress contemplated, since it permits deviations from otherwise rigid and unitary limitations only where the circumstances of the particular plant are "fundamentally different" than those from which the effluent limitation was derived. (Emphasis in original.)

If the Administrator had set a range of effluent limitations, effective consideration could be given in the permit granting process to the individual characteristics of each discharger. But within the announced variance scheme such characteristics will be given no effect whatever unless they are found to be "fundamentally different" from those considered by the Administrator in formulating his effluent limitations. The variance procedure fails to specify the criteria to which the permit grantor is supposed to refer. Applicants and permit grantors to this date have not been given any guidance by the Administrator on what is determinative.

The variance procedure is *not* a valid response to the congressional mandate of flexibility because: (1) "fundamentally different" requires something more than a determination by the permit grantor that a source falls somewhere within an applicable limitation range; and (2) there really is no flexibility, because one either gets a variance *or* is left with the rigid limitation—it is an all or nothing proposition. If the permit grantor were given proper guidelines containing a range of effluent limitations, he could apply the guidelines and the factors contained therein to determine the proper effluent limitations within the range for each discharger. A variance applicant using heaven knows what criteria must show he is "fundamentally different," or he will be left with a limitation with which he cannot comply.

Amicus agrees that the establishment of a variance procedure may be within the discretion of the Administrator as was held by the Second and Fourth Circuits.[20] This procedure, however, must be in addition to the section 304(b) range of effluent limitations. It cannot be a substitute for compliance with the Act.

THE STANDARD OF REVIEW

The questions presented herein require the Court to interpret an Act of Congress by using the Court's usual interpretative tools—logic, careful analysis, and the text and legislative history of the Act. Statutory interpretation has long been recognized as the particular domain of the courts. Chief Justice Marshall declared "It is emphatically the province and duty of the judicial department to say what the law is." *Marbury v.*

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[20] *E. I. DuPont De Nemours v. Train,* —— F.2d ——, 8 ERC 1718 (4th Cir. 1976); *Natural Resources Defense Council, Inc. v. EPA,* —— F.2d ——, 8 E.R.C. 1988 (2d Cir. 1976).

Madison, 1 Cranch 137, 177 (1803). Although courts may give deference to administrative interpretations of their enabling statutes,[21] the duty of interpreting the law is, in the final analysis, a judicial duty, and courts have not hesitated to overule erroneous agency statutory interpretations.[22]

Judicial deference to the Administrator's statutory interpretation proffered here would be inappropriate for several reasons. First, the Administrator's *current* interpretation of the law is contrary to his *original* interpretation. On December 7, 1972, the Administrator testified before the House Committee on Public Works that the Act would require the issuance of section 304 (b) guidelines "for the purpose of assisting the states."[23] In the Administrator's initial announcement of procedures for adopting this sort of regulation he cited as authority section 304(b), but not section 301.[24]

Second, the Administrator's statutory interpretation is self-aggrandizing. He has arrogated to himself power which, Amicus submits, was reserved by Congress for the permit grantors.

Third, the Administrator's statutory interpretation encroaches upon State sovereignty. States with approved permit programs have received authority from their legislatures to issue permits setting effluent limitations. The Administrator has attempted to reduce

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[21] See *Train v. Natural Resources Defense Council, Inc.,* 421 U.S. 60, 87 (1975) and *Udall* v. *Tallman,* 380 U.S. 1, 16-18 (1965).

[22] *Wilderness Society v. Morton,* 479 F.2d 842, 864-66 (D.C. Cir. 1973), and cases cited therein.

[23] Hearings on H. R. 1896 Before the House Committee on Public Works, 92d Cong. 1st Sess. 300 (1972); 2 Leg. Hist. 1198.

[24] 38 *Fed. Reg.* 21202 (August 6, 1973).

that power to a mere ministerial function. In contrast the Act states that "It is the policy of the Congress to recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution . . ." Section 101(b). The Court should look with skepticism upon an agency interpretation of the Act which contravenes that express statutory policy.

Finally, the Administrator cannot claim that he is in a better position than this Court to interpret the relevant sections of the Act. The tools of statutory construction—logic, careful analysis, and the text and legislative history—are equally available to both. As the District of Columbia Circuit observed in *Wilderness Society v. Morton,* 479 F.2d 842, 866 (D.C. Cir. 1973) *cert. denied,* 411 U.S. 917 (1973):

> Perhaps the primary rationale behind the doctrine of deference is the idea of administrative expertise. Thus it has been said that special deference is due when the administrators were involved in the drafting and passage of the statutory language. . . "Administrative construction is less potent than it otherwise would be where it does not rest upon matters peculiarly within the administrator's field of expertise." (Citations omitted.)
>
> There can be do doubt that there is no need for administrative expertise in resolving the question of the meaning of Section 28. Expertise might be needed to decide what is a reasonable pipeline construction area, but it is not needed to decide whether Section 28 precludes construction outside the statutory right-of-way.
>
> "* * * [S]ince the only or principal dispute relates to the meaning of the statutory term, the controversy must ultimately be resolved, not on the basis of matters within the special competence of

> the Secretary, but by judicial application of canons of statutory construction. * * * 'The role of the courts should, in particular, be viewed hospitably where . . . the question sought to be reviewed does not significantly engage the agency's expertise. "[W]here the only or principal dispute relates to the meaning of the statutory term" . . . [the controversy] presents issues on which courts, and not [administrators], are relatively more expert.' * * *"
>
> Barlow v. Collins, 397 U.S. 159, 166, 90 S. Ct. 832, 837, 25 L. Ed. 2d 192 (1970), *quoting* Hardin v. Kentucky Utilities Co., 390 U.S. 1, 14, 88 S. Ct. 651, 19 L. Ed. 2d 787 (1968) (Mr. Justice Harlan, dissenting).

Here, as in *Wilderness Society* and *Barlow* v. *Collins,* the resolution of the issues presented turns on skills in which the Court, not the Administrator, is most expert. See *NLRB v. Brown,* 380 U.S. 278, 290-92 (1965); *National Petroleum Refiners Assn. v. FTC,* 482 F.2d 672, 694 (D.C. Cir. 1973).

CONCLUSION

For the foregoing reasons, the Court should affirm the holding below that jurisdiction to review the Administrator's action lies in the courts of appeals. The Court should reverse the Court of Appeals for the Fourth Circuit on the merits and declare that the Administrator does not have the power to issue single-number effluent limitations under section 301 of the Act. Finally, the Court should declare that the Administrator has failed to comply with the command of section 304(b) of the Act, which requires him to publish guidelines (1) establishing ranges of effluent limitations and (2) specifying the relevant factors which will enable the permit grantors to apply effluent limitations from the guideline ranges for a specific plant.

Respectfully submitted,

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July 16, 1976

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[illegible] OF THE UNITED STATES

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E. I. du Pont de Nemours and Company, et al.,

Petitioners,

v.

Russell E. Train, as Administrator of the Environmental Protection Agency, et al.,

Respondents.

On Writ of Certiorari to the United States Court of Appeals for the Fourth Circuit

BRIEF OF THE AMERICAN PAPER INSTITUTE AS AMICUS CURIAE

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IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1976

No. 75-978

E. I. DU PONT DE NEMOURS AND COMPANY, *et al.*,

Petitioners,

v.

RUSSELL E. TRAIN, as Administrator of the Environmental Protection Agency, *et al.*,

Respondents.

ON WRIT OF CERTIORARI TO
THE UNITED STATES COURT OF APPEALS
FOR THE FOURTH CIRCUIT

BRIEF OF THE AMERICAN PAPER INSTITUTE AS *AMICUS CURIAE*

INTERESTS OF *AMICUS CURIAE*

The American Paper Institute, Inc., (hereinafter "API") is a nonprofit corporation incorporated under the laws of the State of Delaware with its principal place of business at 260 Madison Avenue, New York, New York.

As suggested by its title, API is the representative of more than 200 manufacturers of pulp and paper located

throughout the United States. These companies provide 90 percent of all the pulp, paper and paperboard manufactured domestically. The industry produced in 1975 approximately 52.8 million tons of paper and paperboard and 4.4 million tons of market pulp, amounting to a value of goods shipped of approximately 18.4 Billion Dollars ($18,400,000,000.00). It employs in excess of 281,000 people and pays Three Billion Dollars ($3,000,000,000.00) in wages, salaries and benefits annually.

API and eight of its member companies are petitioners in *American Paper Institute, et al. v. Train, et al.*, Lead Docket No. 74-1480, presently pending before the United States Court of Appeals for the District of Columbia Circuit. API is also a petitioner in *American Paper Institute, et al. v. Train*, Lead Docket No. 76-1524, pending in the United States Court of Appeals for the Third Circuit.[1] Additionally, API filed a brief *amicus curiae* in *American Frozen Food Institute v. Train*, __U.S. App. D.C.__, __F.2d__, 8 E.R.C. 1993 (1976) (Opinion by Judge Edwards of the Sixth Circuit, sitting by designation).

Principal legal issues in those cases as well as this concern an interpretation of the requirements and interrelationship of key provisions of the Federal Water

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[1]The District of Columbia Circuit case challenges regulations promulgated by the Environmental Protection Agency for the "Pulp, Paper, And Paperboard Point Source Category," 39 *Fed. Reg.* 18742 (1974). These regulations applied to approximately one-third of the industry. Briefing and oral argument have been completed, and the parties are awaiting a decision by the court.

The case pending in the Third Circuit challenges regulations promulgated by the Environmental Protection Agency for the industry which apply to the remaining two-thirds of point sources. 41 *Fed. Reg.* 7662 (Feb. 19, 1976).

Pollution Control Act Amendments of 1972 (hereinafter "FWPCA" or "the Act"), particularly Sections 301, 304 and 402, 33 U.S.C. §§1311, 1314 and 1342, which establish the basic regulatory scheme for controlling discharges from existing industrial point sources.

This brief *amicus curiae* treats two major issues which confront the Court in this case. First, API submits that the United States district courts have jurisdiction to review regulations governing discharges from existing industrial point sources. Second, API submits that EPA has illegally promulgated rigid single-number effluent limitations for broad subcategories of existing sources. The clear language of the statute and its legislative history reveal Congress' intent to regulate existing sources through the application of Section 304 *guidelines for effluent limitations* by the permit-granting authorities when issuing permits for existing point sources.

The brief filed by petitioners in this case raises certain issues challenging the Environmental Protection Agency's (hereinafter "EPA" or the "Agency") interpretation of the FWPCA. API has raised similar arguments which not only challenge the regulatory scheme established by the Agency but which provide the Court with an extensive statutory analysis and review of the legislative history in an effort to show the Court the regulatory scheme intended by the Congress. Consideration of this brief *amicus curiae* will ensure that the Court has before it a full range of views by directly affected parties on these important issues. The Court's decision in this case will have major economic and social consequences on the implementation of the water pollution control program of the United States. Finally, the implementation of the Act has a significant and direct economic impact on *amicus curiae's* member companies. A reversal of the

Fourth Circuit decision by this Court will result in the practical and realistic water pollution control program envisioned by the Congress.

Amicus curiae has obtained the consent of counsel from petitioners and respondent for the filing of this brief in accordance with Rule 42.2 of this Court. Those consents are contained herein as Appendices A and B to this brief.

OPINIONS BELOW

The opinion of the United States Court of Appeals for the Fourth Circuit is reported at 528 F.2d 1136 (4th Cir. 1975). The opinion and order of the district court is reported at 383 F. Supp. 1244 (W.D. Va. 1974).

JURISDICTION

The jurisdiction of this Court is invoked pursuant to 28 U.S.C. §1254(1).

QUESTIONS PRESENTED

1. Whether the regulations promulgated by the Environmental Protection Agency for existing sources are reviewable as guidelines for effluent limitations in the United States district courts pursuant to the Administrative Procedure Act, 5 U.S.C. §§701-706 (1970)?

2. Whether the Environmental Protection Agency misinterpreted Sections 301 and 304 of the FWPCA by promulgating single-number effluent limitations rather than promulgating ranges of numbers as guidelines with instructions to permit-granting authorities to consider factors outlined in Section 304 when prescribing effluent limitations for discrete point sources?

STATUTES INVOLVED

The following statutory provisions are set forth in relevant part in Appendix C: The Federal Water Pollution Control Act, as amended, Sections 301, 302, 304, 306, 307, 309, 401, 402, 502, 505 and 509 (33 U.S.C. §§1311, 1312, 1314, 1316, 1317, 1319, 1341, 1342, 1362, 1365 and 1369).

SUMMARY OF ARGUMENT

The regulations promulgated by EPA for existing point sources in the inorganic chemical industry as well as all other industrial point sources are reviewable in the United States district courts pursuant to the Administrative Procedure Act.

First, Sections 301 and 304 of the FWPCA mandate the issuance by the Agency of *guidelines for effluent limitations*. Section 301 of the FWPCA requires the achievement by industry of effluent limitations by July 1, 1977, which shall require the application of the best practicable control technology currently available as defined by the Administrator pursuant to Section 304(b)(1) of the Act. Section 301 of the Act further provides that effluent limitations shall be achieved by July 1, 1983, requiring the application of best available technology economically achievable as determined in accordance with regulations issued pursuant to Section 304(b)(2) of the Act.

Section 301, by its terms, depends for its implementation upon Section 304, which provides that, within one year of the statute's enactment, regulations defining guidelines for effluent limitations shall be promulgated by the Agency. The guidelines shall, among other things, specify the factors to be taken into consideration in

determining the control measures to be utilized for meeting the Section 301 objectives. Accordingly, the statute on its face clearly mandates the issuance of guidelines for effluent limitations pursuant to Section 304(b) of the Act.

Second, the Agency's own construction and interpretation of the Act, beginning with the Act's passage and ending with the notice of proposed rulemaking, demonstrated that EPA intended to issue guidelines for effluent limitations. Prior to and subsequent to the Act's passage, published and spoken statements by Agency officials established that EPA intended to publish guidelines for effluent limitations pursuant to Section 304(b) of the Act. In early 1974, however, in an attempt to circumvent the required administrative procedure, the Agency reversed its position and claimed that the regulations, which had the effect of limitations, were being issued pursuant to Sections 301 *and* 304 of the Act. The inconsistency in the Agency's position is highlighted by its wholesale disregard for the necessity of adjudication prior to the establishment of specific effluent limitations.

Third, Section 304(b) guideline regulations are reviewable in federal district court pursuant to the Administrative Procedure Act. Unless otherwise specified by statute, the proper forum for judicial review of federal agency decisions is the district court. Section 509 of the Act, which sets forth specific Agency actions reviewable in the United States courts of appeals, does not provide for judicial review of Section 304(b) guidelines. Accordingly, Section 304(b) guidelines for effluent limitations are properly reviewable in the federal district courts, and this Court should so hold.

EPA has ignored the plain meaning of the FWPCA and the congressionally determined need for flexible guidelines and has usurped the responsibilities of the permit-granting authorities by illegally promulgating effluent limitations for existing sources rather than issuing guidelines for effluent limitations pursuant to Section 304(b). The effect of EPA's act is to relegate the role of the permit-granting authorities to a clerical, rubber-stamping exercise and to preclude consideration of individual plant characteristics when issuing permits.

The FWPCA represents a comprehensive statutory scheme for the regulation of the discharge of pollutants into navigable waters. Section 301 sets forth the Act's primary objectives in broad terms: the installation of best practicable control technology currently available by 1977 and best available technology economically achievable by 1983 for all industrial point sources. This broad goal is implemented through the federal-state partnership in which state permit-granting authorities or, alternatively, the EPA's Regional Administrators are charged with issuing permits establishing specific effluent limitations for point sources pursuant to Section 402 of the Act. The federal role is outlined in Section 304(b) of the Act, which requires the Administrator to provide guidance to the permit-granting authorities by promulgating guidelines for effluent limitations for various industrial categories. Section 304 provides a mechanism for identifying the 1977 and 1983 technologies and further requires the Administrator to identify "the degree of effluent reduction attainable" by their application. In addition, the Administrator is required to "specify factors to be taken into account" by the permit-granting authorities when establishing particular effluent limitations for individual sources. This interpretation of the FWPCA is consistent with the statutory language, the legislative history and the preenactment and postenactment interpretations of the Act by the Agency.

The positions taken by API on the issues discussed above have been supported in the courts and in the Congress. In *CPC Int'l, Inc. v. Train,* 515 F.2d 1032 (8th Cir. 1975), the court concluded that EPA's existing source regulations were not reviewable in the courts of appeals but rather in the district courts. In the *CPC* case as well as in *American Iron and Steel Institute v. Environmental Protection Agency,* 526 F.2d 1027 (3d Cir. 1975), and *Grain Processing Corp. v. Train,* 407 F. Supp. 96 (S.D. Iowa 1976), *appeal pending,* No. 76-1233 (8th Cir.), the courts held that the Agency was under an obligation to promulgate guidelines for effluent limitations in the form of a range. These courts also required the Agency to specify factors for the permit-granting authorities to take into consideration when determining specific effluent limitations for discrete point sources. Finally, the House Subcommittee on Investigations and Review of the Committee on Public Works held oversight hearings on EPA's implementation of the FWPCA during the summer of 1974. Through its chairman, the Subcommittee registered its concern that EPA's nationally applicable single-number effluent limitations for existing sources were too rigid, impractical and contrary to the more flexible regulatory scheme that Congress intended.

ARGUMENT

I.

REGULATIONS PROMULGATED BY THE ENVIRONMENTAL PROTECTION AGENCY FOR EXISTING SOURCES ARE REVIEWABLE AS GUIDELINES FOR EFFLUENT LIMITATIONS IN THE UNITED STATES DISTRICT COURTS PURSUANT TO THE ADMINISTRATIVE PROCEDURE ACT, 5 U.S.C. §§701-706 (1970).

The United States Court of Appeals for the Eighth Circuit has determined that district courts have jurisdiction to review guidelines for existing sources promulgated pursuant to Section 304(b) of the Act. *CPC Int'l, Inc. v. Train, supra.*[2] API urges this Court to adopt the fundamental concepts in the Eighth Circuit's opinion as they relate to regulations for existing point sources. Additionally, API submits that there are numerous other reasons not considered by the Eighth Circuit which preclude judicial review by the courts of appeals of existing source regulations promulgated pursuant to the FWPCA.

A. The Statutory Framework Established By Congress Contemplated The Issuance Of Guidelines By EPA Pursuant To Section 304(b) Of The Act.

The 1972 amendments to the Federal Water Pollution Control Act fundamentally revised the statutory and regulatory schemes for control of water pollution. Prior to the enactment of the FWPCA, the federal regulatory emphasis had been on the maintenance of water quality standards which had been established throughout the

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[2] The Eighth Circuit was asked to review regulations for existing sources engaged in the processing of corn in the corn wet milling subcategory of the grain mills point source category. 40 C.F.R. §§406.10-406.16.

country. Although this approach was not entirely abandoned by the FWPCA, the primary focus of the 1972 legislation shifted from water quality to control and limitation of effluent discharge from industrial plants into navigable waters. The statutory objective of a regulatory program for industrial and municipal point sources of waste discharges is set forth in Section 301 of the Act, 33 U.S.C. § 1311. By its own terms, Section 301 depends for its implementation upon Section 304, 33 U.S.C. § 1314.

It is manifest, given the language of the statute, that Section 304 requires the issuance by the Agency of guidelines for effluent limitations pursuant to Section 304(b) of the statute prior to the implementation of Section 301 limitations. *CPC Int'l, Inc. v. Train, supra* at 1038. The statutory mandate was emphasized by the decision of the United States District Court for the District of Columbia in *Natural Resources Defense Council, Inc. v. Train*, 6 E.R.C. 1033 (D.D.C. 1973).[3] In that case, plaintiff brought a citizen's enforcement action under Section 505 of the Act, seeking to compel the Administrator to perform a nondiscretionary duty under

[3]That order was subsequently stayed in part and reversed on other grounds by the United States Court of Appeals for the District of Columbia Circuit, per Leventhal, Robb and Nichols, JJ., by memorandum dated October 7, 1974 and later modified accordingly by the United States District Court for the District of Columbia, per Green, J., on November 1, 1974.

On December 5, 1974, in *Natural Resources Defense Council, Inc. v. Train*, 166 U.S. App. D.C. 312, 510 F.2d 692 (1974), *as modified*, March 10, 1975, the United States Court of Appeals for the District of Columbia reversed and remanded the lower court's decision as to certain regulations but upheld the district court's ruling as to others. This decision related solely to the scheduling of promulgation of effluent limitation guidelines for industrial point sources by EPA.

the Act, namely, the issuance of Section 304(b) guideline regulations. In granting in part plaintiff's motion for summary judgment, the district court issued an order which stated:

> 1. Defendants have a mandatory, nondiscretionary duty to publish within one year of enactment of the Act final Section 304(b)(1)(A) *effluent limitation guidelines* necessary to provide comprehensive coverage of all point source discharges;
>
> 2. The proposed schedule for publication of the guidelines shall have a final deadline of no later than October 1, 1974, *in order that the guidelines may be applied meaningfully in the NPDES permit program established by Section 402 of the Act.* 6 E.R.C. at 1033. (Emphasis added.)

Accordingly, the Act on its face, buttressed by these judicial opinions, mandates the issuance of Section 304(b) guidelines for effluent limitations.

The requirement that the Agency issue Section 304(b) guidelines for effluent limitations was clearly stated in *CPC Int'l, Inc. v. Train, supra.* In the *CPC* case, as it did in the Fourth Circuit below, the Agency argued that regulations for existing sources were promulgated pursuant to both Sections 301(b) *and* 304(b) of the Act in an effort to gain access to the courts of appeals under Section 509 of the Act. The Agency's effort to gain such access, however, was discredited by the court in the *CPC* case. The court stated:

> Although policy arguments are advanced on behalf of a contrary interpretation by the EPA and by amicus Natural Resources Defense Council, Congress has resolved the policy issues against their position. 515 F.2d at 1037.

To reach the conclusion that guidelines for effluent limitations could not be promulgated pursuant to Section 301 and that the Act required EPA to issue such guidelines pursuant to Section 304(b), the Eighth Circuit examined the language of the statute and its legislative history. 515 F.2d at 1037. The court concluded that "the statute does not grant to the Administrator a separate power under §301 to promulgate by regulation effluent limitations for existing sources." 515 F.2d at 1037. Accordingly, the court determined that Section 509 of the Act could not constitute the jurisdictional basis for the courts of appeals to review regulations for existing sources.

Perhaps the clearest articulation of what the statute requires and what the obligations of the Agency are in implementing the statute is set forth in the district court's opinion arising out of the remand of the *CPC* case. In that case, Judge Stewart wrote:

> As the court interprets the language of Section 304(b), the guideline regulations to be promulgated by the EPA are meant to set forth two basic standards for both the 1977 and the 1983 technologies. First, the guidelines are to "identify . . . the degree of effluent reduction attainable through the application of the . . . technology . . . for classes and categories of *point sources* . . . ." Section 304(b)(1)(A). The Congress has directed the EPA to determine for each class or category of point sources how much effluent reduction can be achieved through the application of the appropriate technology. Second, the guidelines should specify the factors which may be taken into account in determining, for each individual *point source,* the best measures to achieve the application of the relevant technology. Thus, the guideline regulations are to be two-pronged. They should state the effluent reduction possible for the entire class or category of point sources within a given range and they should also analyze those factors deemed important for the writing of an individual permit within that range. *Grain Processing Corp. v. Train, supra* at 104.

Although other courts have had an opportunity to review the implementation and interpretation of the Act by the Agency, these courts have not been as explicit in defining the Administrator's obligations when promulgating regulations for existing sources. In *American Iron and Steel Institute v. Environmental Protection Agency,* 526 F.2d 1027 (3d Cir. 1975), the court made a somewhat convoluted effort to adopt EPA's argument that it could simultaneously issue regulations pursuant to Sections 301 and 304. The court determined that it did have exclusive jurisdiction to review the regulations promulgated by the Agency for the iron and steel industry; however, it also determined that the Agency was required to establish a range of such effluent limitations in the form of guidelines for effluent limitations pursuant to the congressional mandate in Section 304(b). Thus, the court stated:

> Having determined the "base level," and the "ceiling," he (the Administrator) must then promulgate guidelines which are to guide the permit-issuing authorities in deciding whether, and by how much, limitation to be applied to any individual point source is *more* stringent than the base level (in terms of requiring more effective technology), and more stringent than the ceiling (in requiring a lower amount of effluent discharge). *Thus, we reconcile Sections 301 and 304 in the following manner: The Section 301 limitations represent both the base level or minimum degree of effluent control permissible*

> *and the ceiling (or maximum amount of effluent discharge) permissible nationwide within a given category, and the Section 304 guidelines are intended to provide precise guidance to the permit-issuing authorities in establishing a permissible level of discharge that is more stringent than the ceiling.* 526 F.2d at 1045. (Emphasis added.)

Because of the absence of a range, the Third Circuit regulations were remanded to the Agency for promulgation of regulations including a range and factors to be considered by the permit-issuing authorities.

API submits that the Third Circuit was half correct. That is, the statute does require that effluent limitations guidelines be issued in the form of a range and that factors be specified to be considered by the permit-granting authorities in the application of the range to individual point sources. *See infra* at 29-46. However, API also submits that the Third Circuit's effort to sanction the Agency's Section 301 and Section 304 combined rulemaking theory is incorrect.

Other courts of appeals that have considered the issue of jurisdiction to review the regulations promulgated by the Agency have dealt inadequately with the issues before them. For example, in *American Meat Institute v. Environmental Protection Agency*, 526 F.2d 442 (7th Cir. 1975), the court determined that the regulations challenged by the meat industry were subject to its review. In reaching this conclusion, however, the court relied on the argument that, where courts of appeals differ in construing regulatory statutes, it should defer to the Agency even though the Agency's interpretation of the statute is not "the only one it permissively could have adopted." 526 F.2d at 449-50, citing *Train v. Natural Resources Defense Council, Inc.*, 421 U.S. 60, 75

(1975). While this argument, in the absence of a clear legislative history or a statutory mandate, may be applicable to technical issues peculiarly within the expertise of the regulatory agency, the argument does not apply to the issue of jurisdiction. Jurisdiction is solely within the province of the congress. The import of the Seventh Circuit's decision is that the Agency may, by its own interpretation of the statute, determine what court shall have jurisdiction to review its actions. Such an approach is indefensible in view of this Court's prior pronouncements on the issue of what body determines jurisdiction to review Agency actions. *See Abbott Laboratories v. Gardner*, 387 U.S. 136, 140 (1967), discussed *infra* at 28-29.

Similarly, the Second Circuit, in *Hooker Chemicals & Plastics Corp. v. Train*, ___F.2d___, 8 E.R.C. 1961 (2d Cir. 1976), approved EPA's promulgation of limitations pursuant to Section 301 and Section 304, although it stated that it did so "against [a] background of puzzling statutory language, ambiguous legislative history and conflicting court decisions." 8 E.R.C. at 1965.

It is API's position, as developed below, that regulations for existing sources promulgated by the Agency constitute guidelines for effluent limitations. This position is supported by the statutory language of the Act and the legislative history. Further, API submits that the Agency itself recognized its obligation under Section 304(b) but chose, as a matter of expediency, to deviate from the statutory mandate by publishing effluent limitations in the form of specific numeric values to be nationally applied to a given category of industrial point sources without consideration of individual plant characteristics as set forth in the Act. This Court should determine that, irrespective of the Agency's belated

characterization of its regulations as "limitations," the Agency is required by the Act to issue and did, in fact, issue Section 304(b) guidelines reviewable in the United States district courts pursuant to the judicial review provisions of the Administrative Procedure Act, 5 U.S.C. §§701-706 (1970).

B. The Agency's Own Construction Of The Act Demonstrated That EPA Issued Guidelines For Effluent Limitations Pursuant To Section 304(b) Of The Act.

Shortly after the Act's initial passage by the House and Senate, but prior to its final enactment on October 18, 1972, the then Administrator of EPA, the Honorable William D. Ruckelshaus, gave a speech before the annual meeting of the Water Pollution Control Federation in Atlanta, Georgia, at which he stated in reference to the new Act:

> *Every plant involves individual factors which differentiate it from others and directly affect what would be the best practicable control technology for that plant. EPA's guidelines* . . . will represent the most comprehensive effort ever made on a national basis to provide information with respect to industrial water control technology. However, to do the job on specific plants will take the full-time efforts of hundreds of Federal and State pollution control people, working as a team . . . .
>
> The *EPA guidelines,* whether issued under the new law or otherwise, will not be the final answer to pollution control questions. . . . (Emphasis added.)[4]

This passage demonstrates that the Agency's construction of the Act, contemporaneous with its passage, reflected

[4]The speeches of the Administrator are available at the Public Information Office of EPA in Washington, D.C.

the need for "guidelines" to be individually applied to each point source. Such "guidelines" are manifestly responsive to Section 304(b).

Five months later, the Agency transmitted a letter to the Effluent Standards and Water Quality Information Advisory Committee (hereinafter "ESWQIAC") stating that it was embarking upon the preparation of Section 304(b) guideline regulations.[5]

Approximately ten months after the Administrator's speech, EPA published in the *Federal Register*, "Effluent Limitations Guidelines And Standards Of Performance For New Sources—Advance Notice of Public Review Procedures," 38 *Fed. Reg.* 21202 (1973). That publication announced:

> Advanced notice is hereby given concerning notices of proposed rule making to be published by the Environmental Protection Agency ("EPA") with respect to effluent limitations *guidelines*, standards of performance, and pretreatment standards for new sources pursuant to sections 304(b), 306 and 307(c) of the Federal Water Pollution Control Act, as amended . . . . (Emphasis added.)

[5]Section 515(b)(1) of the FWPCA establishes the Effluent Standards and Water Quality Information Advisory Committee:

> No later than one hundred and eighty days prior to the date on which the Administrator is required to publish any proposed regulations required by section 304(b) of this Act, . . . he shall transmit to the Committee a notice of intent to propose such regulations.

The court in the *CPC* case recognized that, if EPA were authorized to promulgate regulations under Section 301, "one would expect §515 to require a reference to the ESWQIAC in such instances." 515 F.2d at 1039.

The legal authority for this announcement was explained as follows in the notice:

> Section 301(b) of the Act requires the achievement . . . of effluent limitations for point sources, . . . which require the application of the best practicable control technology currently available *as defined by the Administrator pursuant to Section 304(b)* . . . . (Emphasis added.)

It is Section 304(b) of the Act that requires the Administrator to publish "regulations providing guidelines for effluent limitations setting forth the degree of effluent reduction attainable through the application of the best practicable control technology currently available . . . ." Thus, EPA, as late as ten months after enactment of the FWPCA, notified the public of its mandated obligation and intent to publish Section 304(b) guidelines. Nowhere does the August 6, 1973 publication hint that the regulations will contain or constitute *effluent limitations per se;* nowhere does EPA point to authority for such action nor its intention to pursue such an ill-advised course.

The unambiguous authority for the Agency's issuance of guidelines pursuant to Section 304(b) of the Act is further underscored by the "Proposed Guidelines and Standards for the Pulp, Paper and Paperboard Manufacturing Point Source Category," 39 *Fed. Reg.* 1908 (1974). That publication referred back to the August 6, 1973 publication and again recited the legal explanation quoted above:

> The regulations proposed herein set forth effluent limitations guidelines, *pursuant to Section 304(b) of the Act* . . . . (Emphasis added.)

It is, therefore, beyond question that the Act, its contemporaneous administrative interpretations and

EPA's *Federal Register* notices all advised that Section 304(b) guidelines were not only required but would be forthcoming.

EPA now claims, however, that its regulations for existing sources constitute "effluent limitations" under Section 301(b) as well as guidelines under Section 304(b). Therefore, EPA contends that they are reviewable only in the United States court of appeals, pursuant to Section 509 of the Act and not in the United States district courts.

Respondent bases its argument on an eleventh-hour memorandum that was prepared by EPA's Assistant Administrator for Enforcement and General Counsel, entitled "Environmental Protection Agency Memorandum On Judicial Review Of Effluent Limitations Guidelines," February 25, 1974, 4 *Env. Rptr., Current Developments,* 1833 (Mar. 1, 1974). That document takes the position that Sections 301 and 304 are identical and that neither section has an independent existence:

> A final factor . . . relates to the relationship between Sections 301 and 304. Section 509(b) makes no mention of judicial review of the Section 304(b) guidelines for effluent limitations. However, the effluent limitations guidelines which the Agency is presently issuing under Section 304(b) are also being issued under Section 301 and establish effluent limitations under Section 301. Thus, these guidelines fall within the provision in Section 509(b) for judicial review within 90 days of "any effluent or other limitation under section 301." The effluent limitations guidelines promulgated by the Agency will implement both Section 301 and Section 304. Since it would be impossible to challenge the Section 301 limitations without challenging the Section 304(b) guidelines, the requirements in Sec-

tion 509(b) that limitations promulgated pursuant to Section 301 be challenged in the United States Court of Appeals and within 90 days also must be considered to include challenges to Section 304 guidelines. *Id.* at 1834.

This after-the-fact memorandum constitutes a boot-strapping exercise. Neither the August 6, 1973 nor the January 15, 1974 publication in the *Federal Register* (proposed regulations for the paper industry), *supra,* purports to implement Section 301. Both of those documents unequivocally cite Section 304(b) as their legislative predicate. Section 301 is merely cross-referenced.[6]

The Agency's attempt to short-circuit the carefully prescribed statutory scheme set forth by Congress and the Agency's further attempt to divest petitioners of federal district court judicial review cannot be countenanced. The Agency has combined several steps clearly delineated in the Act into a single step and has promulgated regulations affecting all industries with complete disregard for the factors enumerated in Section 304 and the licensing role established in Section 402.

The inconsistency in and the illegality of this position as maintained by the Agency are brought into bold relief by reference to the distinction between administrative rule-making and adjudication.

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[6]After the fact, following publication of the February 25, 1974 memorandum, EPA's final regulations state in their preamble:

> This final rulemaking is promulgated pursuant to sections *301,* 304(b) and (c), 306(b) and (c) and 307(c) of the Federal Water Pollution Control Act, as amended.... 39 *Fed. Reg.* at 18742. (Emphasis added.)

Administrative procedures for rulemaking and adjudication are governed by the Administrative Procedure Act, 5 U.S.C. §§553 and 554 (1970). "Rulemaking" refers to administrative promulgation of regulations of general applicability, without reference to specific conditions in a particularized application of the rules. *Pacific Coast European Conference v. Federal Maritime Comm'n,* 126 U.S. App. D.C. 230, 376 F.2d 785 (1967). Section 553 of the Administrative Procedure Act provides, in relevant part, that:

> (b) General notice of proposed rule making shall be published in the Federal Register. . . .
>
> * * *
>
> (c) After notice required by this section, the agency shall give interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments with or without opportunity for oral presentation.

"Adjudication," on the other hand, refers to case-by-case determinations made by an administrative agency. Section 554 of the Administrative Procedure Act, governing adjudications, states:

> (a) This section applies, according to the provisions thereof, in every case of adjudication required by statute to be determined on the record after opportunity for an agency hearing. . . .
>
> * * *
>
> (b) Persons entitled to notice of an agency hearing shall be timely informed of—
>
> (1) the time, place, and nature of the hearing;
>
> (2) the legal authority and jurisdiction under which the hearing is to be held; and

(3) the matters of fact and law asserted.

* * *

(c) The agency shall give all interested parties opportunity for—

(1) the submission and consideration of facts, arguments, offers of settlement, or proposals of adjustment when time, the nature of the proceeding, and the public interest permit; and

(2) to the extent that the parties are unable so to determine a controversy by consent, hearing and decision on notice and in accordance with sections 556 and 557 of this title.

The distinction between rulemaking and adjudication with respect to administrative due process considerations is readily apparent from a juxtaposition of these two sections. Administrative due process in a rulemaking proceeding is satisfied by the opportunity for public comment upon adequate public notice. Due process in an adjudicatory proceeding, on the other hand, requires in most cases a public hearing, development of a record, justification of the Agency's position and an opportunity for scrutiny thereof, including examination of witnesses. *Goldberg v. Kelly,* 397 U.S. 254 (1970). The requirement in an agency-related statute that a hearing be held prior to agency action signals the application of adjudicatory rather than rulemaking proceedings under the Administrative Procedure Act. *LaRue v. Udall,* 116 U.S. App. D.C. 396, 324 F.2d 428 (1963), *cert. denied,* 376 U.S. 907 (1964); *Gardner v. United States,* 239 F.2d 234 (5th Cir. 1956).

Applying these standards to the facts of this case, it is clear that the Agency perceived its role in promulgating effluent limitations guidelines as rulemaking rather than adjudication. For example, in denying API's request for a

formal public hearing prior to promulgation of the paper industry regulations, Mr. Alan G. Kirk II, Assistant Administrator for Enforcement and General Counsel of EPA, remarked:

The general rulemaking requirements of Section 553 of the Administrative Procedure Act only require that notice and opportunity to comment on proposed regulations be provided. *See* Appendix D.

If EPA had restricted itself to the issuance of effluent guidelines pursuant to Section 304 of the FWPCA, as API submits EPA should have done, then General Counsel Kirk's interpretation and response would have been appropriate. Section 304, by itself, does not contemplate adjudication in discrete cases but rather mandates the issuance of guideline regulations for the entire industry through the vehicle of rulemaking.

Section 402 of the FWPCA, however, which establishes the permit program whereby individual dischargers would apply for and receive permits to discharge in conformance with an effluent limitation requires an adjudicatory proceeding for each permit applicant. Section 402(a)(1) provides:

. . . the Administrator may, *after opportunity for public hearing,* issue a permit for the discharge of any pollutant, or combination of pollutants. . . . (Emphasis added.)

Section 402(b) provides, in part:

At any time after the promulgation of the guidelines required by subsection (b)(2) of section 304 of this Act, the Governor of each State desiring to administer its own permit program for discharges into navigable waters within its jurisdiction may submit to the Administrator a full and complete description of the program it proposes to establish * * * The

Administrator shall approve each such submitted program unless he determines that adequate authority does not exist:

* * *

(3) To insure that the public, and any other State the waters of which may be affected, receive *notice* of each application for a permit and to *provide an opportunity for public hearing before a ruling on each such application. . . .* (Emphasis added.)

In promulgating specific effluent limitations and thereby usurping the permit-granting role of the states under Section 402, the Agency should have at least provided the same rights guaranteed by the Administrative Procedure Act for adjudicatory proceedings to its own proceedings for its actions to be even colorably legal. Yet, when API requested such a public hearing prior to EPA's admitted promulgation of specific limitations for the paper industry, this opportunity was denied by the Agency. *See* March 25, 1974 letter from Mr. Alan G. Kirk II, Assistant Administrator for Enforcement and General Counsel, EPA, to Mr. Thomas H. Truitt, counsel for API. *See* Appendix D.[7]

The significance of the Agency's maneuvers, when viewed in the context of "rulemaking" versus "adjudication," is at once obvious. EPA has sought to invoke the rulemaking intent of Section 304 in frustrating API's attempts for a full-scale hearing while at the same time

[7]The Agency has promulgated regulations governing adjudicatory hearings at the permit-granting stage. 40 C.F.R. §125 *et seq.* These regulations provide for representation, prehearing conferences, oral and written testimony, including cross-examination of witnesses, and a ruling on the record, among other procedural safeguards. Thus, the Agency recognizes that the individual application for a permit does require an adjudicatory proceeding.

engaging in *de facto* adjudication as contemplated by Section 402. The result of the Agency's machinations has been to deprive API and other industries of substantial administrative due process hearing rights that would have accrued were the Section 402 permit process implemented as contemplated by the statute rather than as misperceived by the Agency.

EPA should not be permitted to have it both ways and engage in adjudication under the guise of rulemaking. This Court should accordingly recognize that the scope of the Agency's discretion at this stage of the Act's implementation is limited to the establishment of guidelines and that this is not only manifest from the language of the statute but also was acknowledged by EPA in its initial response to the FWPCA's passage.

C. Section 304(b) Guideline Regulations Are Reviewable In Federal District Court Pursuant To The Administrative Procedure Act.

Unless committed to agency discretion or specifically precluded by Congress, administrative action shall be subject to judicial review, 5 U.S.C. § 701 (1970); *Citizens To Preserve Overton Park, Inc. v. Volpe,* 401 U.S. 402 (1971); *Abbott Laboratories v. Gardner,* 387 U.S. 136, 140 (1967); *Rusk v. Cort,* 369 U.S. 367, 379-80 (1962). The proper forum for judicial review in an administrative law case is a United States district court unless otherwise specified by statute. The Administrative Procedure Act, 5 U.S.C. § 703, provides in pertinent part as follows:

The form of proceeding for judicial review is the special statutory review proceeding relevant to the subject matter in a court specified by statute or, in the absence or inadequacy thereof, any applicable form of legal action, including actions for declara-

tory judgments or writs of prohibitory or mandatory injunction or habeas corpus, in a court of competent jurisdiction.

Section 509 of the FWPCA sets forth the specific Agency actions which are reviewable in courts of appeals. Section 304 is not mentioned in Section 509, and, therefore, the United States district courts have jurisdiction to review regulations for existing sources.

Section 509(b) provides:

> (1) Review of the Administrator's action (A) in promulgating any standard of performance under section 306, (B) in making any determination pursuant to section 306(b)(1)(C), (C) in promulgating any effluent standard, prohibition, or treatment standard under section 307, (D) in making any determination as to a State permit program submitted under section 402(b), (E) *in approving or promulgating any effluent limitation or other limitation under section 301, 302, or 306, and (F) in issuing or denying any permit under section 402, may be had by any interested person in the Circuit Court of Appeals of the United States for the Federal judicial district in which such person resides or transacts such business upon application by such person.* Any such application shall be made within ninety days from the date of such determination, approval, promulgation, issuance or denial, or after such date only if such application is based solely on grounds which arose after such ninetieth day. (Emphasis added.)

Where statutory language is clear and unambiguous, courts are bound by the congressional intent. *See Jay v. Boyd*, 351 U.S. 345, 357 (1956); *Lewis v. United States*, 92 U.S. (2 Otto) 618, 621 (1876). Section 509(b) specifies certain administrative actions pursuant to various provisions of the Act that are reviewable in the courts of appeals; Section 304 is conspicuously omitted. Under these circumstances, there is no basis on which to allege any ambiguity, and, therefore, Section 304 guidelines are reviewable pursuant to the Administrative Procedure Act. *CPC Int'l, Inc. v. Train, supra* at 1034.

A related principle of statutory construction restricts the judiciary from adding words to statutory language. *62 Cases, Etc. v. United States*, 340 U.S. 593, 600-01 (1951); *DeSoto Securities Co. v. Commissioner of Internal Revenue*, 235 F.2d 409, 411 (7th Cir. 1956). Yet EPA's position would require the Court to do just that. Further, it is an axiom of statutory construction that a legislative reference to a series of provisions or matters which omits a provision or matter of similar nature is indicative of legislative intent to treat the nonreferenced provision differently than those mentioned. *Case v. Kelly*, 133 U.S. 21 (1890); *Maiatico v. United States*, 112 U.S. App. D.C. 295, 302 F.2d 880 (1962). Certainly, the omission of Section 304 from Section 509(b) was not a legislative oversight and, therefore, its omission cannot be ignored by this Court. *Commonwealth of Kentucky ex rel. Hancock v. Ruckelshaus*, 362 F. Supp. 360, 365 (W.D. Ky. 1973), *aff'd*, 497 F.2d 1172 (6th Cir. 1974), *aff'd sub nom. Commonwealth of Kentucky v. Train*, ___U.S.__, 8 E.R.C. 2100 (1976).

Moreover, an integrated reading of the FWPCA shows that Congress did not intend to include Section 304(b) regulations under the review provisions of Section 509. The conclusion that the United States courts of appeals are not the proper forum for review is confirmed by recent amendments to the FWPCA, Pub. L. No. 93-207, 87 Stat. 906 (1973). The purpose of the 1973 amendments was correction of "oversights or incorrect refer-

ences . . . [that] do not alter the substance of the Act or depart from the original intent of Congress." H.R. Rep. No. 680, 93d Cong., 1st Sess. (1973). Although Congress revised Section 509, the only modification consisted of an incorporation of pretreatment standards under Section 307(b) as being subject to review under Section 509. Congress again did not include Section 304(b) guidelines on the list of actions subject to special review under Section 509(b).

A plain reading of the statute also substantiates the conclusion that Section 304(b) was not intended to be covered by Section 509(b). First, United States district court review is specifically mentioned in connection with the grant of subpoena power to the Administrator of EPA in the very same statutory section covering courts of appeals jurisdiction, thus illustrating that the courts of appeals do not have exclusive jurisdiction to review all provisions of the Act. Section 509(a)(2), 33 U.S.C. §1369(a)(2). Second, there are numerous adjudicatory and rulemaking functions to be performed by EPA that are not covered by Section 509 and, therefore, are reviewable pursuant to the Administrative Procedure Act.[8]

A useful precedent for resolving the issue before this Court is *Abbott Laboratories v. Gardner, supra.* In *Abbott,* plaintiff sought United States district court review. The government argued unsuccessfully that review was lodged in the courts of appeals based upon a provision in the Food, Drug and Cosmetic Act, 21 U.S.C.

[8]Sections 201, 204(b)(2), 208 and 212; Sections 303 and 311; Sections 304(a), (c), (d), (e), (f), (g) and (h); and Sections 403, 404 and 405 are all regulatory actions reviewable pursuant to the Administrative Procedure Act in the district courts.

§371, which provided for review of certain regulations in the courts of appeals. The court concluded that the provision relied upon by the government was limited in scope and did not control jurisdiction to review actions taken by the Commissioner to implement sections of the statute not covered by that provision. A similar rationale should be applied by the Court in this case to support the determination that the United States district court has jurisdiction over this case.

II.

THE ENVIRONMENTAL PROTECTION AGENCY MISINTERPRETED SECTIONS 301 AND 304 OF THE FWPCA BY PROMULGATING SINGLE-NUMBER EFFLUENT LIMITATIONS RATHER THAN PROMULGATING RANGES OF NUMBERS AS GUIDELINES WITH INSTRUCTIONS TO PERMIT-GRANTING AUTHORITIES TO CONSIDER FACTORS OUTLINED IN SECTION 304 WHEN PRESCRIBING EFFLUENT LIMITATIONS FOR DISCRETE POINT SOURCES.

The Environmental Protection Agency improperly issued single-number effluent limitations rather than *guidelines* for effluent limitations in its regulations for existing sources. This interpretation and administration of the FWPCA is wrong and cannot be fairly or sensibly applied to any complex and diverse industry. EPA failed to understand the distinction between effluent limitations and guidelines for effluent limitations.

A review of Sections 301, 304 and 402 against the background of the 1972 legislation shows that EPA's interpretation of the FWPCA as demonstrated by the Agency's implementation of these sections is contrary to the statute and technologically simplistic. The illegality of EPA's actions is confirmed by the Eighth Circuit's opinion in *CPC Int'l, Inc. v. Train, supra,* and the sub-

sequent district court decision in *Grain Processing Corp. v. Train, supra,* both of which concluded that EPA does not have the authority to issue regulations for existing sources pursuant to Section 301(b) but is required to promulgate guidelines for effluent limitations pursuant to Section 304(b). Further support for API's position is found in *American Iron and Steel Institute v. Environmental Protection Agency, supra,* for the proposition that EPA must issue a range of limitations for industrial categories and specify factors for the permit-granting authorities to consider in order to comply with Section 304(b) of the Act.

A. Sections 301, 304 And 402 Of The FWPCA Require The Administrator Of EPA To Issue "Guidelines For Effluent Limitations" And To "Specify" Factors Enumerated In Section 304 To Be Taken Into Account In The Application Of The Guidelines To A Specific Point Source.

Section 301 sets forth the goals of the FWPCA for treatment of waste from industrial sources. Section 301 requires that the 1977 and 1983 goals are to be defined by the Administrator pursuant to Section 304 of the Act. By its own terms, Section 301 depends upon Sections 304 and 402 for its implementation. Section 304(b), in turn, establishes how "guidelines for effluent limitations" are to be developed. Section 301 states objectives but has no independent standing. Once having established "guidelines for effluent limitations," the next stage in the regulatory process requires the application of the technology-based guidelines prescribed by Section 304 to individual point sources discussed in Section 301. This is accomplished by the Section 402 permit program.

Simply stated, the statutory scheme requires EPA to publish "guidelines for effluent limitations" to be achieved by all existing sources by 1977 and 1983. These

guidelines may take various forms, either as numeric ranges within which a particular source must be placed or as numeric guidelines, which serve as guideposts to the permit-granting authorities. The factors enumerated in Section 304 are essential to determining the application of the guidelines to a specific source.[9]

EPA's contention that it may promulgate regulations pursuant to Section 301 is without merit. In *CPC Int'l, Inc. v. Train, supra,* the court concluded that Section 301 does not permit EPA to promulgate effluent limitations for existing sources by regulation and that the "permit-issuing authority is to follow the guidelines promulgated under §304(b), and not to refer to independent regulations promulgated under §301." 515 F. 2d at 1038.[10]

1. The Plain Meaning Of Section 304 Confirms The Administrator's Obligation To Promulgate Guidelines And To Specify Factors.

The pivotal role of Section 304 regulations as a reference point for permitting authorities is firmly anchored in the statutory text. An attentive reading of

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[9]By requiring 304(b) regulations to take the form of a range accompanied by specified factors, the Congress did not intend to provide permit-granting authorities *carte blanche* in establishing effluent limitations for individual point sources. The Congress did intend, however, to have the Administrator set boundaries within which all permit-granting authorities would have to make decisions to ensure rigorous regulation of industrial point sources.

[10]In reaching this conclusion, the Eighth Circuit relied on Section 402(d)(2) of the Act, which states in pertinent part:

> No permit shall issue * * * (B) if the Administrator within ninety days of the date of transmittal of the proposed permit by the State objects in writing to the issuance of such permit as *being outside the guidelines* and requirements of this Act. (Emphasis added.)

Section 304 conveys the design of the scheme Congress envisioned. The statute refers to guidelines.[11]

The guidelines of Section 304(b) are determined by a two-step procedure undertaken by the Administrator. First, the Administrator is to identify the degree of effluent reduction attainable through the application of (a) best practicable control technology and (b) best available technology. Second, the guidelines are to specify factors to be taken into account by permit-granting authorities when prescribing particular effluent limitations for individual point sources.

The choice of the word "guidelines" is suggestive of a range concept to provide indicators to the states or Regional Administrators charged with issuing permits. Moreover, the legislation refers to the "degree of effluent reduction attainable." This too suggests a spread of numbers. Congress wrote a directive to establish the boundaries for reduction of waste discharges from various industrial categories based on existing plant capabilities improved by 1977 treatment technologies.

The statutory scheme recognizes that there may be several practicable technologies for a given type of

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[11]The concept of guidelines has been employed in other areas of the law where a range of actions is reasonable and appropriate and strict rules are overly prohibitive and counterproductive. For example, HEW has issued guidelines for school desegregation plans. *See United States v. Jefferson County Board of Education*, 372 F.2d 836 (5th Cir. 1966). The Council on Environmental Quality has issued guidelines to aid in the implementation of Section 102(2)(c) of the National Environmental Policy Act, 42 U.S.C. §4332(2)(c). *See Greene County Planning Board v. FPC*, 455 F.2d 412 (2d Cir. 1972). Further, the FWPCA employs a guidelines concept in other circumstances. Section 204(b)(2), 33 U.S.C. §1284(b)(2).

industrial operation that achieve differing results depending upon particular circumstances, such as raw waste load, climate, ability of an individual plant site or process to accommodate or link onto the control technology and other variables.

Congress, recognizing the complexity of the problem, chose to cast the program in a flexible mold. It is significant that Section 304 does not direct EPA to issue regulations *establishing* effluent limitations taking certain factors into account. EPA must issue guidelines and *specify* factors to be applied in determining the technology "*applicable* to any point source." (Emphasis added.)

2. The Legislative History Of Section 304 Confirms That Congress Intended That The Administrator Promulgate Flexible Guidelines, In The Form Of A Range, And Specify Factors Which The Permit-Granting Authorities Are To Consider In Issuing Permits.

API's reading of Section 304 is not only sensible but also has firm roots in the FWPCA's legislative history, manifesting the congressional understanding that Section 304 requires guidelines providing a range of effluent limitations.

a) Prior Legislation

The focal point of the Federal Water Pollution Control Act of 1965, as amended, 33 U.S.C. §1151 *et seq.*, was water quality standards. The states were charged with setting use criteria for the various bodies of water within a particular state. Chemical profiles were then drawn and criteria established to guarantee the suitability of the stream for the designated use. A body of water classified for industrial use would require a different profile than

would a stream identified for recreation. S. Rep. No. 414, 92d Cong., 1st Sess. 405 (1971), reprinted in *Environmental Policy Division of the Congressional Reference Service, A Legislative History of the Water Pollution Control Act Amendments of 1972* (hereinafter *"Leg. Hist."*) at 1422-23.

Having established a profile for stream and water quality criteria, states were then supposed to develop implementation plans restricting sources discharging into the stream to levels of pollution compatible with the criteria necessary for the designated use. *Id.*

When the Senate Subcommittee hearings began, it focused upon S. 523, introduced by Senator Muskie, which continued the water quality approach.[12] While Congress was reviewing the 1965 legislation, EPA was attempting to create a new regulatory framework for coping with industrial pollution. The approach took the form of a permit program for industrial point source dischargers through the use of the newly rediscovered Rivers and Harbors or Refuse Act of 1899, 33 U.S.C. §407.

The thrust of the administratively developed Refuse Act Permit Program (hereinafter "RAPP") was to tie individual dischargers to specific effluent restrictions based upon the development of effluent guidelines.[13]

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[12]Congress, in its review of the 1965 legislation, initially focused on amendments that would preserve the basic water quality standards approach but clarify its intention that implementation plans should include "effluent requirements" as well. Such requirements were to be developed by states in light of information collected by EPA. Violations of the requirements were directly enforceable. *Hearings Before the Subcommittee on Air and Water Pollution of the Senate Committee on Public Works*, 92d Cong., 1st Sess. pt. 1, at 213 (1971).

[13]Prior to announcement of the Refuse Act Permit Program on December 23, 1970, EPA had contracted for research and studies

[Footnote continued]

The guidelines were an attempt to implement the concept of "secondary treatment" so that EPA's regional officials and officials from qualified states could have a reference point for issuing individual permits. The specifics of this program were communicated to the Senate Committee on Public Works at a time when that Committee was examining the 1965 Water Pollution Control Act seeking to strengthen it with a stronger federal-state program. *See CPC Int'l, Inc. v. Train, supra* at 1040-42. The hearings before the Senate Subcommittee explored in detail EPA's plan for implementing the RAPP. *Hearings Before the Subcommittee on Air and Water Pollution, supra* at pt. 9, 4291-4415[14] The melding of the RAPP and the federal-state partnership which existed in the 1965 Act is revealed in the bill reported in October, 1971 by the Senate Committee on Public Works.[15]

b) Flexibility: The Range

The first explanation of the Senate bill contains a specific direction to the Administrator to set forth a range in the Section 304(b) regulations:

> In defining best practicable for any given industrial category, the Committee expects the Administrator to take a number of factors into account. These

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to determine the methods and quality of treatment for 22 basic industries. (*The National Water Permit Program*, United States Environmental Protection Agency, pp. 6-7, June 1, 1973.)

[14]*See also* S. Rep. No. 414, *supra* at 43:

> Much of the time the Committee devoted to this Act centered on an effort to resolve the existing water quality program and the separate pollution permit program developing under the 1899 Refuse Act. *Leg. Hist.* at 1461.

[15]S. Rep. No. 414, 92d Cong., 1st Sess. (1971); *Leg. Hist.* at 1415.

factors should include the age of the plants, their size and the unit processes involved and the cost of applying such controls. *In effect, for any industrial category, the Committee expects the Administrator to define a range of discharge levels, above a certain base level applicable to all plants within that category.* S. Rep. No. 414, *supra* at 50; *Leg. Hist.* at 1468. (Emphasis added.)

The Senate Report then states that Section 304(b) "requires the Administrator . . . to publish guidelines for setting effluent limitations reflecting the mandate of section 301, which will be imposed as conditions of permits issued under section 402." *Id.* at 51; *Leg. Hist.* at 1469. The House Report similarly directs the "Administrator . . . to publish . . . regulations for the establishment of effluent limitations," not regulations establishing them. H.R. Rep. No. 911, 92d Cong., 2d Sess. 107 (1972); *Leg. Hist.* at 794. The conferees, in their explanation of Section 304(b), confirm that flexibility, not rigidity, was contemplated:

> Section 304(b)(1)(B) provides that the Administrator's regulations providing guidelines for effluent limitations shall specify factors to be taken into account . . . . S. Rep. No. 1236, 92d Cong., 2d Sess. 125 (1972); *Leg. Hist.* at 308.

Finally, Senator Muskie, author of the original Senate bill and one of the conferees, reported to the Senate that:

> Section 304(b), as agreed to by the Conferees, requires that the Administrator publish regulations which shall provide *guidelines* for the establishment of the effluent limitations to be achieved by categories and classes of point sources . . . . 118 *Cong. Rec.* 16873 (daily ed. Oct. 4, 1972); *Leg. Hist.* at 171. (Emphasis added.)

c) Uniformity

The statements in the Senate and Conference Reports setting forth Congress' expectation for uniformity in the administration of the industrial point source regulatory program do not conflict with the statements suggesting that Section 304 requires a range.

The importance of uniformity was clearly articulated by the Conference Committee Report:

> Except as provided in section 301(c) of this Act, the intent of the Conferees is that effluent limitations applicable to individual point sources within a given category or class be as *uniform as possible*. The Administrator is expected to be precise in his guidelines . . . so as to assure that *similar* point sources with similar characteristics, regardless of their location or the nature of the water into which the discharge is made, will meet similar *effluent limitations*. S. Rep. No. 1236, *supra* at 126 (1972); *Leg. Hist.* at 309. (Emphasis added.)[16]

Such statements reflect considerable dissatisfaction, expressed both to and by the Senate Subcommittee, with exclusive use of water quality standards for regulation. The water quality approach, without more, provided no uniformity in an effort to limit discharge of pollutants.[17]

d) Flexibility And Uniformity Reconciled

Those portions of the legislative history which refer to range and flexibility and those remarks that stress

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[16]*See also* 118 *Cong. Rec.* 16874 (daily ed. Oct. 4, 1972); *Leg. Hist.* at 172, for further remarks of Senator Muskie concerning his discussion of "uniformity."

[17]*See also Hearings Before the Subcommittee on Air and Water Pollution, supra* at 4358-60.

uniformity can thus be easily reconciled if the latter statements are considered in light of the 1965 legislation.

Congress intended uniformity in effort, not uniformity of effluent limitations. Unlike the 1965 Act's water quality approach, the approach established by the FWPCA requires every source to do something to achieve best practicable and best available levels of control. That does not mean the controls or the achievable results are the same for all plants, nor does it mean that no flexibility is to be allowed to permit-granting authorities. The Senate Report could not be clearer on this subject. In discussing Sections 301 and 402, the Report states:

> The program proposed by this Section [301] will be implemented through permits issued in Section 402. S. Rep. No. 414, *supra* at 42; *Leg. Hist.* at 1460.
>
> * * *
>
> Through the permit program established under section 402, with the help of those States which have effective programs, the Administrator and the States can and should . . . be able to apply specific effluent limitations for each industrial source. *Id.* at 44; *Leg. Hist.* at 1462.
>
> * * *
>
> The information on the technology of control developed under section 304 should facilitate the administration of [the Section 402 permit] system. *Id. at 72; Leg. Hist.* at 1490.

The legislative history thus substantiates and emphasizes the plain meaning of Section 304 and underscores the congressional intent to provide flexibility in the context of the relationship between Sections 301, 304 and

402.[18] As the court concluded in *CPC Int'l, Inc. v. Train, supra:*

> The legislative history confirms that Congress intended to enforce *uniformity of conditions for existing plants, not by authorizing the promulgation of regulations under §301*, but by granting the EPA power to issue permits and to veto state-issued permits which do not comply with guidelines promulgated under §304(b). 515 F.2d at 1039. (Emphasis added.)

During recent hearings before the House Subcommittee on Investigations and Review of the Committee on Public Works,[19] the Subcommittee Chairman, Congressman Jim Wright, who had been a conferee and instrumental in hammering out the final version of the FWPCA, reiterated the congressional understanding that uniformity was not to be accomplished through inflexible national regulations:

> The task we have given you in attempting to arrive at standards of this type, and evaluate their economic and ecological impact is not an easy task. We are fully aware of that.
>
> We recognize that it would be much more convenient for an agency where it simply has one inflexible uniform and unvarying standard.

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[18] Early in the 1971 hearings, the Senate Subcommittee was on notice that a meaningful and realistic approach to effluent limitations would involve some case-by-case consideration. *See*, for example, Statement of Dr. Isaiah Gellman, Technical Director of the National Council of the Paper Industry for Air and Stream Improvement, Inc., *Hearings Before the Subcommittee on Air and Water Pollution, supra* at 4068-78.

[19] *Hearings on Implementation of the Federal Water Pollution Control Act Before the House Subcommittee on Investigations and Review of the Committee on Public Works*, 93d Cong., 2d Sess. (1974) (hereinafter "*Oversight Hearings*").

> You have created subcategories, and you delineate between them.
>
> We recognize the difficulty of our suggesting that additional subcategorizations might be desirable from a purely administrative standpoint.
>
> *I merely suggest that the word practicable was a deliberate term used for the purpose of tempering the application of a uniform and inflexible standard which might be absolutely right for one plant, but which might be devastating for another, and unnecessary for certain plants. Oversight Hearings* at 491. (Emphasis added.)

This important statement goes to the very heart of whether EPA was to establish rigid numeric effluent limitations or whether EPA was to publish guidelines for effluent limitations. API submits that the latter function was the intent of Congress, particularly in view of the permit program established in Section 402 of the Act.

e) Role Of The Permit Program

If it was a preoccupation with uniformity that prompted EPA to establish a single number for broad industrial categories, the Agency took a somewhat myopic view of the legislative history of the FWPCA. EPA's interpretation negates the balance struck by Congress between state and federal responsibilities. The approach adopted by EPA reduces the permit process to a clerical rubber-stamping exercise. Qualified states and EPA's regional authorities need only look to EPA's numbers, determine the process category into which a plant falls, ascertain production levels, and then multiply.

Such a routine function can hardly be what Congress envisioned given the intense and extensive legislative debate about the desirability of delegating the permit-issuing function to qualified states. The Senate version of

Section 402 in S. 2770 provided EPA with the authority to engage in a permit-by-permit review of state-issued permits prior to their being issued. *See* S. Rep. No. 414, *supra* at 71; *Leg. Hist.* at 1489. That review was limited by the House's federalized version of Section 402 in H.R. 11896.[20] The final legislation provides the states with the opportunity to take the primary role in issuing permits and EPA with the opportunity to review state-approved permits.

The court, in *CPC Int'l, Inc. v. Train,* has already analyzed the legislative history of the FWPCA and concluded that effluent limitations were to be set in the permit-issuing process. This function during the permitting process is confirmed in the earliest testimony by the Administrator at the time the legislation was proposed and reiterated throughout the House and Senate considerations of the Act. *See CPC Int'l, Inc. v. Train, supra* at 1039-40. The same interpretation of the role of

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[20] The House Report accompanying H.R. 11896, H.R. Rep. No. 911, *supra* at 127, states:

> The Committee considered extensively the proposition that all the permits issued by the States ought to be subject to review and possible veto by the Administrator. During the Committee's hearings, the Governors and other representatives of the States, almost unanimously, stressed the need to put the maximum responsibility for the permit program in the States. They deplored the duplication and second guessing that could go on if the Administrator could veto the State decisions. The Committee believes that the States ought to have the opportunity to assume the responsibilities that they have requested. If, however, a State fails to carry out its obligations and misuses the permit program, the Administrator is fully authorized under subsection (c)(3) of this section to withdraw his approval of a State program. *Leg. Hist.* at 814.

the permit program was adopted by the Third Circuit in *American Iron and Steel Institute v. Environmental Protection Agency, supra* at 1040-47.

If further support is needed to show that it is the permit-granting authority that is to apply the Section 304 guidelines regulations, it is found in Senator Muskie's summary of the Conference Committee's deliberations:

> NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM [Section 402]
>
> The Conference agreement provides that the Administrator may review any permit issued pursuant to this Act as to its consistency with the guidelines and requirements of the Act. Should the Administrator find that a permit is proposed which does not conform to the guidelines issued under section 304 and other requirements of the Act, he shall notify the State of his determination, and the permit cannot issue until the Administrator determines that the necessary changes have been made to assure compliance with such guidelines and requirements. 118 *Cong. Rec.* 16875 (daily ed. Oct. 4, 1972); *Leg. Hist.* at 176.

API submits that the legislative history of the FWPCA, as interpreted in the *CPC, Grain Processing* and *American Iron and Steel Institute* cases, shows that the permit-granting authorities are to apply Section 304 guidelines in establishing effluent limitations for individual point sources.

3. The Agency's Construction Of The Act Contemporaneous With Its Passage Recognized The Need For Flexible Guidelines.

API's contention that Sections 301, 304 and 402 create a program whereby general guidelines are to be issued so as to allow flexible application in the permit process is supported in the earliest pronouncements by EPA officials delivered contemporaneously with the enactment of the FWPCA. The importance of a case-by-case review at the permit-granting stage was articulated by the Administrator of EPA, the Honorable William D. Ruckelshaus, when he discussed the FWPCA after it had passed both Houses of Congress at the annual meeting of the Water Pollution Control Federation on October 11, 1972 in Atlanta, Georgia, *supra* at 20.

The policy articulated in the Administrator's speech had been embodied in the establishment, implementation and administration of the RAPP.[21] Administrator Ruckelshaus' statement should be given great weight. This Court has frequently recognized that the contemporaneous construction of a statute by one charged with its enforcement must be given substantial consideration. *Udall v. Tallman*, 380 U.S. 1, 16-18 (1965) (and cases cited therein). Courts have generally taken particular cognizance of statements made by federal agency administrators charged with the implementation of a statute. *D.C. Federation of Civic Ass'ns, Inc. v. Volpe*, 140 U.S. App. D.C. 162, 171, 434 F.2d 436, 445 (1970).

From the initial development of the FWPCA in response to the problems of previous legislation up through and beyond the passage of the Act, there was agreement concerning EPA's role in issuing guidelines

[21] 33 C.F.R. §209 (1971).

which were to identify technology and specify factors for the permit-granting authorities.

In summary, the language of the statute, its background and legislative history map the route Congress intended EPA to follow. That route leads to flexible administration accomplished by the publication of guidelines to assist permit-granting authorities in prescribing effluent limitations for individual plants, taking into consideration their particular characteristics.

B. A Comparison Of Section 301 And Other Provisions Of The Act Confirms The Congressional Intent To Preclude The Promulgation Of Effluent Limitations For Existing Sources By Regulation.

Section 301 of the FWPCA does not provide any authority for EPA to promulgate effluent limitations by regulations. *CPC Int'l, Inc. v. Train, supra* at 1038. In the case below, respondent cavalierly argued that Sections 301(b) and 304(b) can be combined to achieve Section 301(b) regulations because in the normal course the results of the Section 304(b) study would develop into effluent limitations under Section 301(b). As indicated earlier, Congress made a clear distinction between guidelines for effluent limitations and effluent limitations for existing point sources. Additionally, a review of other pertinent provisions of the Act shows that Congress did not intend EPA to promulgate rigid national standards for existing sources.

This is confirmed by those provisions of the Act where such national standards are expressly required. For example, such "nationally promulgated standards" were expressly mandated for new sources in Section 306(b), for toxic discharges in Section 307(a), and for pretreatment standards in Section 307(b) and (c). *See CPC Int'l, Inc. v. Train, supra* at 1038.

In providing for national standards in these areas, Congress did four things: (1) it used the term "standards," a word which takes on special meaning because of its use under the Act; (2) it expressly provided that the standards were to be published by regulation; (3) it put deadlines on the process, requiring that the Administrator publish the standards within a fixed period of time; and (4) it provided that standards were to be enforceable independent of the permit system. *See* Sections 306(e) and 307(d).

Congress' specificity in these provisions for national standards and the absence of such provisions in Section 301 demonstrate that the omission "was not an oversight." *CPC Int'l, Inc. v. Train, supra* at 1038.

Finally, Section 515 of the Act contradicts EPA's statutory interpretation. Section 515 establishes the Effluent Standards and Water Quality Information Advisory Committee. Six months before the publication of guidelines under Section 304(b) and standards under Sections 306 and 307, the Administrator is to notify the ESWQIAC of his intention to promulgate such regulations. The ESWQIAC can then hold public hearings on scientific and technical aspects of the proposed standards and guidelines. Whether or not hearings are held, the Act directs the ESWQIAC to transmit to EPA within 120 days all relevant scientific and technical information which it possesses. There is no mention of Section 301 regulations in Section 515. If EPA were intended to promulgate regulations under Section 301, "one would expect § 515 to require reference to the ESWQIAC in such instances." *CPC Int'l, Inc. v. Train, supra* at 1039.

Thus, it is clear that EPA's attempt to promulgate single-number effluent limitations pursuant to Section 301(b) of the FWPCA is not only inconsistent with

Sections 304 and 402 but wholly inconsistent with all other provisions of the Act.

CONCLUSION

For the reasons stated above, *amicus curiae* respectfully submits that this Court determine that the United States district courts have jurisdiction to review guidelines for effluent limitations promulgated by the Environmental Protection Agency pursuant to Section 304(b) of the Act; that the Agency is required to promulgate guidelines for effluent limitations in the form of a range of numbers; and that the Agency is required to specify factors along with its guidelines for effluent limitations which are to be considered by the permit-granting authorities when applying the guidelines to individual point sources.

Respectfully submitted,

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July 16, 1976

APPENDICES

APPENDIX A

OFFICE OF THE SOLICITOR GENERAL
Washington, D.C. 20530

May 7, 1976

Thomas H. Truitt, Esq.
Truitt, Fabrikant, Bucklin & Lenzner
910 Seventeenth Street, N.W.
Washington, D.C. 20006

Re: E. I. duPont de Nemours, et al. v.
Russell Train, et al., No. 75-978

Dear Mr. Truitt:

Your letter of May 3 to Assistant Attorney General Taft has been referred to me.

In response to your request, I hereby consent to your filing a brief amicus curiae in the above-captioned case on behalf of the American Paper Institute.

Sincerely,

/s/Robert H. Bork
Robert H. Bork
Solicitor General

APPENDIX B

CLEARY, GOTTLIEB, STEEN & HAMILTON
1250 Connecticut Avenue, N.W.
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(202) 223-2151

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Telex: 64179

July 1, 1976

Thomas H. Truitt, Esq.
Truitt, Fabrikant, Bucklin & Lenzner
910 Seventeenth Street, N.W.
Washington, D. C. 20006

Re: E. I. duPont de Nemours & Company, et al., v. Russell E. Train, et al., No. 75-978 In the Supreme Court of the United States

Dear Mr. Truitt:

In response to your request, I hereby consent to your filing a brief *amicus curiae* in the above entitled case on behalf of the American Paper Institute.

Very truly yours,

/s/Robert C. Barnard
Robert C. Barnard
Attorney for Petitioners

APPENDIX C

STATUTES INVOLVED

Section 301, 33 U.S.C. §1311, states:

"Sec. 301. (a) Except as in compliance with this section and sections 302, 306, 307, 318, 402, and 404 of this Act, the discharge of any pollutant by any person shall be unlawful.

"(b) In order to carry out the objective of this Act there shall be achieved—

"(1)(A) not later than July 1, 1977, effluent limitations for point sources, other than publicly owned treatment works, (i) which shall require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 304(b) of this Act, or (ii) in the case of a discharge into a publicly owned treatment works which meets the requirements of subparagraph (B) of this paragraph, which shall require compliance with any applicable pretreatment requirements and any requirements under section 307 of this Act; and

"(B) for publicly owned treatment works in existence on July 1, 1977, or approved pursuant to section 203 of this Act prior to June 30, 1974 (for which construction must be completed within four years of approval), effluent limitations based upon secondary treatment as defined by the Administrator pursuant to section 304(d)(1) of this Act; or,

"(C) not later than July 1, 1977, any more stringent limitation, including those necessary to meet water quality standards, treatment standards, or schedules of compliance, established pursuant to

any State law or regulations (under authority preserved by section 510) or any other Federal law or regulation, or required to implement any applicable water quality standard established pursuant to this Act.

"(2)(A) not later than July 1, 1983, effluent limitations for categories and classes of point sources, other than publicly owned treatment works, which (i) shall require application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act, which such effluent limitations shall require the elimination of discharges of all pollutants if the Administrator finds, on the basis of information available to him (including information developed pursuant to section 315), that such elimination is technologically and economically achievable for a category or class of point sources as determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act, or (ii) in the case of the introduction of a pollutant into a publicly owned treatment works which meets the requirements of subparagraph (B) of this paragraph, shall require compliance with any applicable pretreatment requirements and any other requirement under section 307 of this Act; and

"(B) not later than July 1, 1983, compliance by all publicly owned treatment works with the requirements set forth in section 201(g)(2)(A) of this Act.

"(c) The Administrator may modify the requirements of subsection (b)(2)(A) of this section with respect to

any point source for which a permit application is filed after July 1, 1977, upon a showing by the owner or operator of such point source satisfactory to the Administrator that such modified requirements (1) will represent the maximum use of technology within the economic capability of the owner or operator; and (2) will result in reasonable further progress toward the elimination of the discharge of pollutants.

"(d) Any effluent limitation required by paragraph (2) of subsection (b) of this section shall be reviewed at least every five years and, if appropriate, revised pursuant to the procedure established under such paragraph.

"(e) Effluent limitations established pursuant to this section or section 302 of this Act shall be applied to all point sources of discharge of pollutants in accordance with the provisions of this Act.

"(f) Notwithstanding any other provisions of this Act it shall be unlawful to discharge any radiological, chemical, or biological warfare agent or high-level radioactive waste into the navigable waters.

Section 302, 33 U.S.C. § 1312, states:

"Sec. 302. (a) Whenever, in the judgment of the Administrator, discharges of pollutants from a point source or group of point sources, with the application of effluent limitations required under section 301(b)(2) of this Act, would interfere with the attainment or maintenance of that water quality in a specific portion of the navigable waters which shall assure protection of public water supplies, agricultural and industrial uses, and the protection and propagation of a balanced population of shellfish, fish and wildlife, and allow recreational activities in and on the water, effluent limitations (including alternative effluent control strategies) for such point

source or sources shall be established which can reasonably be expected to contribute to the attainment or maintenance of such water quality.

"(b)(1) Prior to establishment of any effluent limitation pursuant to subsection (a) of this section, the Administrator shall issue notice of intent to establish such limitation and within ninety days of such notice hold a public hearing to determine the relationship of the economic and social costs of achieving any such limitation or limitations, including any economic or social dislocation in the affected community or communities, to the social and economic benefits to be obtained (including the attainment of the objective of this Act) and to determine whether or not such effluent limitations can be implemented with available technology or other alternative control strategies.

"(2) If a person affected by such limitation demonstrates at such hearing that (whether or not such technology or other alternative control strategies are available) there is no reasonable relationship between the economic and social costs and the benefits to be obtained (including attainment of the objective of this Act), such limitation shall not become effective and the Administrator shall adjust such limitation as it applies to such person.

"(c) The establishment of effluent limitations under this section shall not operate to delay the application of any effluent limitation established under section 301 of this Act.

Section 304, 33 U.S.C. § 1314, states:

"Sec. 304. (a)(1) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall develop and publish, within one

year after the date of enactment of this title (and from time to time thereafter revise) criteria for water quality accurately reflecting the latest scientific knowledge (A) on the kind and extent of all identifiable effects on health and welfare including, but not limited to, plankton, fish, shellfish, wildlife, plant life, shorelines, beaches, esthetics, and recreation which may be expected from the presence of pollutants in any body of water, including ground water; (B) on the concentration and dispersal of pollutants, or their byproducts, through biological, physical, and chemical processes; and (C) on the effects of pollutants on biological community diversity, productivity, and stability, including information on the factors affecting rates of eutrophication and rates of organic and inorganic sedimentation for varying types of receiving waters.

"(2) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall develop and publish, within one year after the date of enactment of this title (and from time to time thereafter revise) information (A) on the factors necessary to restore and maintain the chemical, physical, and biological integrity of all navigable waters, ground waters, waters of the contiguous zone, and the oceans; (B) on the factors necessary for the protection and propagation of shellfish, fish, and wildlife for classes and categories of receiving waters and to allow recreational activities in and on the water; and (C) on the measurement and classification of water quality; and (D) for the purpose of section 303, on and the identification of pollutants suitable for maximum daily load measurement correlated with the achievement of water quality objectives.

"(3) Such criteria and information and revisions thereof shall be issued to the States and shall be

published in the Federal Register and otherwise made available to the public.

"(b) For the purpose of adopting or revising effluent limitations under this Act the Administrator shall, after consultation with appropriate Federal and State agencies and other interested persons, publish within one year of enactment of this title, regulations, providing guidelines for effluent limitations, and, at least annually thereafter, revise, if appropriate, such regulations. Such regulations shall—

"(1)(A) identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of the best practicable control technology currently available for classes and categories of point sources (other than publicly owned treatment works); and

"(B) specify factors to be taken into account in determining the control measures and practices to be applicable to point sources (other than publicly owned treatment works) within such categories or classes. Factors relating to the assessment of best practicable control technology currently available to comply with subsection (b)(1) of section 301 of this Act shall include consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application, and shall also take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate;

"(2)(A) identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of the best control measures and practices achievable including treatment techniques, process and procedure innovations, operating methods, and other alternatives for classes and categories of point sources (other than publicly owned treatment works); and

"(B) specify factors to be taken into account in determining the best measures and practices available to comply with subsection (b)(2) of section 301 of this Act to be applicable to any point source (other than publicly owned treatment works) within such categories or classes. Factors relating to the assessment of best available technology shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate; and

"(3) identify control measures and practices available to eliminate the discharge of pollutants from categories and classes of point sources, taking into account the cost of achieving such elimination of the discharge of pollutants.

"(c) The Administrator, after consultation, with appropriate Federal and State agencies and other interested persons, shall issue to the States and appropriate water pollution control agencies within 270 days after enactment of this title (and from time to time thereafter) information on the processes, procedures, or operating methods which result in the elimination or reduction of the discharge of pollutants to implement standards of performance under section 306 of this Act. Such infor-

mation shall include technical and other data, including costs, as are available on alternative methods of elimination or reduction of the discharge of pollutants. Such information, and revisions thereof, shall be published in the Federal Register and otherwise shall be made available to the public.

"(d)(1) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall publish within sixty days after enactment of this title (and from time to time thereafter) information, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, on the degree of effluent reduction attainable through the application of secondary treatment.

"(2) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall publish within nine months after the date of enactment of this title (and from time to time thereafter) information on alternative waste treatment management techniques and systems available to implement section 201 of this Act.

"(e) The Administrator, after consultation with appropriate Federal and State agencies and other interested persons, shall issue to appropriate Federal agencies, the States, water pollution control agencies, and agencies designated under section 208 of this Act, within one year after the effective date of this subsection (and from time to time thereafter) information including (1) guidelines for identifying and evaluating the nature and extent of nonpoint sources of pollutants, and (2) processes, procedures, and methods to control pollution resulting from—

"(A) agricultural and silvicultural activities, including runoff from fields and crop and forest lands;

"(B) mining activities, including runoff and siltation from new, currently operating, and abandoned surface and underground mines;

"(C) all construction activity, including runoff from the facilities resulting from such construction;

"(D) the disposal of pollutants in wells or in subsurface excavations;

"(E) salt water intrusion resulting from reductions of fresh water flow from any cause, including extraction of ground water, irrigation, obstruction, and diversion; and

"(F) changes in the movement, flow, or circulation of any navigable waters or ground waters, including changes caused by the construction of dams, levees, channels, causeways, or flow diversion facilities.

Such information and revisions thereof shall be published in the Federal Register and otherwise made available to the public.

"(f)(1) For the purpose of assisting States in carrying out programs under section 402 of this Act, the Administrator shall publish, within one hundred and twenty days after the date of enactment of this title, and review at least annually thereafter and, if appropriate, revise guidelines for pretreatment of pollutants which he determines are not susceptible to treatment by publicly owned treatment works. Guidelines under this subsection shall be established to control and prevent the discharge into the navigable waters, the contiguous zone, or the ocean (either directly or through publicly owned treatment works) of any pollutant which interferes with, passes through, or otherwise is incompatible with such works.

"(2) When publishing guidelines under this subsection, the Administrator shall designate the category or categories of treatment works to which the guidelines shall apply.

"(g) The Administrator shall, within one hundred and eighty days from the date of enactment of this title, promulgate guidelines establishing test procedures for the analysis of pollutants that shall include the factors which must be provided in any certification pursuant to section 401 of this Act or permit application pursuant to section 402 of this Act.

"(h) The Administrator shall (1) within sixty days after the enactment of this title promulgate guidelines for the purpose of establishing uniform application forms and other minimum requirements for the acquisition of information from owners and operators of point-sources of discharge subject to any State program under section 402 of this Act, and (2) within sixty days from the date of enactment of this title promulgate guidelines establishing the minimum procedural and other elements of any State program under section 402 of this Act which shall include:

"(A) monitoring requirements:

"(B) reporting requirements (including procedures to make information available to the public);

"(C) enforcement provisions; and

"(D) funding, personnel qualifications, and manpower requirements (including a requirement that no board or body which approves permit applications or portions thereof shall include, as a member, any person who receives, or has during the previous two years received, a significant portion of his

income directly or indirectly from permit holders or applicants for a permit).

"(i) The Administrator shall, within 270 days after the effective date of this subsection (and from time to time thereafter), issue such information on methods, procedures, and processes as may be appropriate to restore and enhance the quality of the Nation's publicly owned fresh water lakes.

"(j)(1) The Administrator shall, within six months from the date of enactment of this title, enter into agreements with the Secretary of Agriculture, the Secretary of the Army, and the Secretary of the Interior to provide for the maximum utilization of the appropriate programs authorized under other Federal law to be carried out by such Secretaries for the purpose of achieving and maintaining water quality through appropriate implementation of plans approved under section 208 of this Act.

"(2) The Administrator, pursuant to any agreement under paragraph (1) of this subsection is authorized to transfer to the Secretary of Agriculture, the Secretary of the Army, or the Secretary of the Interior any funds appropriated under paragraph (3) of this subsection to supplement any funds otherwise appropriated to carry out appropriate programs authorized to be carried out by such Secretaries.

"(3) There is authorized to be appropriated to carry out the provisions of this subsection, $100,000,000 per fiscal year for the fiscal year ending June 30, 1973, and the fiscal year ending June 30, 1974.

Section 306, 33 U.S.C. § 1316, states:

"Sec. 306. (a) For purposes of this section:

"(1) The term 'standard of performance' means a standard for the control of the discharge of pollutants which reflects the greatest degree of effluent reduction which the Administrator determines to be achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants.

"(2) The term 'new source' means any source, the construction of which is commenced after the publication of proposed regulations prescribing a standard of performance under this section which will be applicable to such source, if such standard is thereafter promulgated in accordance with this section.

"(3) The term 'source' means any building, structure, facility, or installation from which there is or may be the discharge of pollutants.

"(4) The term 'owner or operator' means any person who owns, leases, operates, controls, or supervises a source.

"(5) The term 'construction' means any placement, assembly, or installation of facilities or equipment (including contractual obligations to purchase such facilities or equipment) at the premises where such equipment will be used, including preparation work at such premises.

"(b)(1)(A) The Administrator shall, within ninety days after the date of enactment of this title publish (and from time to time thereafter shall revise) a list of categories of sources, which shall, at the minimum, include:

"pulp and paper mills;
"paperboard, builders paper and board mills;
"meat product and rendering processing;
"dairy product processing;

"grain mills;
"canned and preserved fruits and vegetables processing;
"canned and preserved seafood processing;
"sugar processing;
"textile mills;
"cement manufacturing;
"feedlots;
"electroplating;
"organic chemicals manufacturing;
"inorganic chemicals manufacturing;
"plastic and synthetic materials manufacturing;
"soap and detergent manufacturing;
"fertilizer manufacturing;
"petroleum refining;
"iron and steel manufacturing;
"nonferrous metals manufacturing;
"phosphate manufacturing;
"steam electric powerplants;
"ferroalloy manufacturing;
"leather tanning and finishing;
"glass and asbestos manufacturing;
"rubber processing; and
"timber products processing.

"(B) As soon as practicable, but in no case more than one year, after a category of sources is included in a list under subparagraph (A) of this paragraph, the Administrator shall propose and publish regulations establishing Federal standards of performance for new sources within such category. The Administrator shall afford interested persons an opportunity for written comment on such proposed regulations. After considering such comments, he shall promulgate, within one hundred and twenty days after publication of such proposed regulations, such standards with such adjustments as he deems appropriate. The Administrator shall, from time to time, as technol-

ogy and alternatives change, revise such standards following the procedure required by this subsection for promulgation of such standards. Standards of performance, or revisions thereof, shall become effective upon promulgation. In establishing or revising Federal standards of performance for new sources under this section, the Administrator shall take into consideration the cost of achieving such effluent reduction, and any non-water quality environmental impact and energy requirements.

"(2) The Administrator may distinguish among classes, types, and sizes within categories of new sources for the purpose of establishing such standards and shall consider the type of process employed (including whether batch or continuous).

"(3) The provisions of this section shall apply to any new source owned or operated by the United States.

"(c) Each State may develop and submit to the Administrator a procedure under State law for applying and enforcing standards of performance for new sources located in such State. If the Administrator finds that the procedure that the law of any State require the application and enforcement of standards of performance to at least the same extent as required by this section, such State is authorized to apply and enforce such standards of performance (except with respect to new sources owned or operated by the United States).

"(d) Notwithstanding any other provision of this Act, any point source the construction of which is commenced after the date of enactment of the Federal Water Pollution Control Act Amendments of 1972 and which is so constructed as to meet all applicable standards of performance shall not be subject to any more stringent standard of performance during a ten-year period begin-

ning on the date of completion of such construction or during the period of depreciation or amortization of such facility for the purposes of section 167 or 169 (or both) of the Internal Revenue Code of 1954, whichever period ends first.

"(e) After the effective date of standards of performance promulgated under this section, it shall be unlawful for any owner or operator of any new source to operate such source in violation of any standard of performance applicable to such source.

Section 307, 33 U.S.C. §1317, states:

"Sec. 307. (a)(1) The Administrator shall, within ninety days after the date of enactment of this title, publish (and from time to time thereafter revise) a list which includes any toxic pollutant or combination of such pollutants for which an effluent standard (which may include a prohibition of the discharge of such pollutants or combination of such pollutants) will be established under this section. The Administrator in publishing such list shall take into account the toxicity of the pollutant, its persistence, degradability, the usual or potential presence of the affected organisms in any waters, the importance of the affected organisms and the nature and extent of the effect of the toxic pollutant on such organisms.

"(2) Within one hundred and eighty days after the date of publication of any list, or revision thereof, containing toxic pollutants or combination of pollutants under paragraph (1) of this subsection, the Administrator, in accordance with section 553 of title 5 of the United States Code, shall publish a proposed effluent standard (or a prohibition) for such pollutant or combination of pollutants which shall take into account the toxicity of the pollutant, its persistence, degradability, the usual or

potential presence of the affected organisms in any waters, the importance of the affected organisms and of the nature and extent of the effect of the toxic pollutant on such organisms, and he shall publish a notice for a public hearing on such proposed standard to be held within thirty days. As soon as possible after such hearing, but not later than six months after publication of the proposed effluent standard (or prohibition), unless the Administrator finds, on the record, that a modification of such proposed standard (or prohibition) is justified based upon a preponderance of evidence adduced at such hearings, such standard (or prohibition) shall be promulgated.

"(3) If after a public hearing the Administrator finds that a modification of such proposed standard (or prohibition) is justified, a revised effluent standard (or prohibition) for such pollutant or combination of pollutants shall be promulgated immediately. Such standard (or prohibition) shall be reviewed and, if appropriate, revised at least every three years.

"(4) Any effluent standard promulgated under this section shall be at that level which the Administrator determines provides an ample margin of safety.

"(5) When proposing or promulgating any effluent standard (or prohibition) under this section, the Administrator shall designate the category or categories of sources to which the effluent standard (or prohibition) shall apply. Any disposal of dredged material may be included in such a category of sources after consultation with the Secretary of the Army.

"(6) Any effluent standard (or prohibition) established pursuant to this section shall take effect on such date or dates as specified in the order promulgating such standard, but in no case more than one year from the date of such promulgation.

"(7) Prior to publishing any regulations pursuant to this section the Administrator shall, to the maximum extent practicable within the time provided, consult with appropriate advisory committees, States, independent experts, and Federal departments and agencies.

"(b)(1) The Administrator shall, within one hundred and eighty days after the date of enactment of this title and from time to time thereafter, publish proposed regulations establishing pretreatment standards for introduction of pollutants into treatment works (as defined in section 212 of this Act) which are publicly owned for those pollutants which are determined not to be susceptible to treatment by such treatment works or which would interfere with the operation of such treatment works. Not later than ninety days after such publication, and after opportunity for public hearing, the Administrator shall promulgate such pretreatment standards. Pretreatment standards under this subsection shall specify a time for compliance not to exceed three years from the date of promulgation and shall be established to prevent the discharge of any pollutant through treatment works (as defined in section 212 of this Act) which are publicly owned, which pollutant interferes with, passes through, or otherwise is incompatible with such works.

"(2) The Administrator shall, from time to time, as control technology, processes, operating methods, or other alternatives change, revise such standards following the procedure established by this subsection for promulgation of such standards.

"(3) When proposing or promulgating any pretreatment standard under this section, the Administrator shall

designate the category or categories of sources to which such standard shall apply.

"(4) Nothing in this subsection shall affect any pretreatment requirement established by any State or local law not in conflict with any pretreatment standard established under this subsection.

"(c) In order to insure that any source introducing pollutants into a publicly owned treatment works, which source would be a new source subject to section 306 if it were to discharge pollutants, will not cause a violation of the effluent limitations established for any such treatment works, the Administrator shall promulgate pretreatment standards for the category of such sources simultaneously with the promulgation of standards of performance under section 306 for the equivalent category of new sources. Such pretreatment standards shall prevent the discharge of any pollutant into such treatment works, which pollutant may interfere with, pass through, or otherwise be incompatible with such works.

"(d) After the effective date of any effluent standard or prohibition or pretreatment standard promulgated under this section, it shall be unlawful for any owner or operator of any source to operate any source in violation of any such effluent standard or prohibition or pretreatment standard.

Section 309, 33 U.S.C. §1319, states:

"Sec. 309. (a)(1) Whenever, on the basis of any information available to him, the Administrator finds that any person is in violation of any condition or limitation which implements section 301, 302, 306, 307, or 308 of this Act in a permit issued by a State under an approved permit program under section 402 of this Act, he shall proceed under his authority in paragraph (3) of

this subsection or he shall notify the person in alleged violation and such State of such finding. If beyond the thirtieth day after the Administrator's notification the State has not commenced appropriate enforcement action, the Administrator shall issue an order requiring such person to comply with such condition or limitation or shall bring a civil action in accordance with subsection (b) of this section.

"(2) Whenever, on the basis of information available to him, the Administrator finds that violations of permit conditions or limitations as set forth in paragraph (1) of this subsection are so widespread that such violations appear to result from a failure of the State to enforce such permit conditions or limitations effectively, he shall so notify the State. If the Administrator finds such failure extends beyond the thirtieth day after such notice, he shall give public notice of such finding. During the period beginning with such public notice and ending when such State satisfies the Administrator that it will enforce such conditions and limitations (hereafter referred to in this section as the period of 'federally assumed enforcement'), the Administrator shall enforce any permit condition or limitation with respect to any person –

"(A) by issuing an order to comply with such condition or limitation, or

"(B) by bringing a civil action under subsection (b) of this section.

"(3) Whenever on the basis of any information available to him the Administrator finds that any person is in violation of section 301, 302, 306, 307, or 308 of this Act, or is in violation of any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act by him or by a State, he shall issue an order requiring such person to comply with such section or requirement, or he shall bring a civil action in accordance with subsection (b) of this section.

"(4) A copy of any order issued under this subsection shall be sent immediately by the Administrator to the State in which the violation occurs and other affected States. Any order issued under this subsection shall be by personal service and shall state with reasonable specificity the nature of the violation, specify a time for compliance, not to exceed thirty days, which the Administrator determines is reasonable, taking into account the seriousness of the violation and any good faith efforts to comply with applicable requirements. In any case in which an order under this subsection (or notice to a violator under paragraph (1) of this subsection) is issued to a corporation, a copy of such order (or notice) shall be served on any appropriate corporate officers. An order issued under this subsection relating to a violation of section 308 of this Act shall not take effect until the person to whom it is issued has had an opportunity to confer with the Administrator concerning the alleged violation.

"(b) The Administrator is authorized to commence a civil action for appropriate relief, including a permanent or temporary injunction, for any violation for which he is authorized to issue a compliance order under subsection (a) of this section. Any action under this subsection may be brought in the district court of the United States for the district in which the defendant is located or resides or is doing business, and such court shall have jurisdiction to restrain such violation and to require compliance. Notice of the commencement of such action shall be given immediately to the appropriate State.

"(c)(1) Any person who willfully or negligently violates section 301, 302, 306, 307, or 308 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act by the Administrator or by a State, shall be punished

by a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than one year, or by both. If the conviction is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $50,000 per day of violation, or by imprisonment for not more than two years, or by both.

"(2) Any person who knowingly makes any false statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under this Act or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Act, shall upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than six months, or by both.

"(3) For the purposes of this subsection, the term 'person' shall mean, in addition to the definition contained in section 502(5) of this Act, any responsible corporate officer.

"(d) Any person who violates section 301, 302, 306, 307, or 308 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act by the Administrator, or by a State, and any person who violates any order issued by the Administrator under subsection (a) of this section, shall be subject to a civil penalty not to exceed $10,000 per day of such violation.

"(e) Whenever a municipality is a party to a civil action brought by the United States under this section, the State in which such municipality is located shall be joined as a party. Such State shall be liable for payment of any judgment, or any expenses incurred as a result of complying with any judgment, entered against the muni-

cipality in such action to the extent that the laws of that State prevent the municipality from raising revenues needed to comply with such judgment.

Section 401, 33 U.S.C. § 1341, states:

"Sec. 401. (a)(1) Any applicant for a Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates or will originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over the navigable waters at the point where the discharge originates or will originate, that any such discharge will comply with the applicable provisions of sections 301, 302, 306, and 307 of this Act. In the case of any such activity for which there is not an applicable effluent limitation or other limitation under sections 301(b) and 302, and there is not an applicable standard under sections 306 and 307, the State shall so certify, except that any such certification shall not be deemed to satisfy section 511(c) of this Act. Such State or interstate agency shall establish procedures for public notice in the case of all applications for certification by it and, to the extent it deems appropriate, procedures for public hearings in connection with specific applications. In any case where a State or interstate agency has no authority to give such a certification, such certification shall be from the Administrator. If the State, interstate agency, or Administrator, as the case may be, fails or refuses to act on a request for certification, within a reasonable period of time (which shall not exceed one year) after receipt of such request, the certification requirements of this subsection shall be waived with respect to such Federal

application. No license or permit shall be granted until the certification required by this section has been obtained or has been waived as provided in the preceding sentence. No license or permit shall be granted if certification has been denied by the State, interstate agency, or the Administrator, as the case may be.

"(2) Upon receipt of such application and certification the licensing or permitting agency shall immediately notify the Administrator of such application and certification. Whenever such a discharge may affect, as determined by the Administrator, the quality of the waters of any other State, the Administrator within thirty days of the date of notice of application for such Federal license or permit shall so notify such other State, the licensing or permitting agency, and the applicant. If, within sixty days after receipt of such notification, such other State determines that such discharge will affect the quality of its waters so as to violate any water quality requirement in such State, and within such sixty-day period notifies the Administrator and the licensing or permitting agency in writing of its objection to the issuance of such license or permit and requests a public hearing on such objection, the licensing or permitting agency shall hold such a hearing. The Administrator shall at such hearing submit his evaluation and recommendations with respect to any such objection to the licensing or permitting agency. Such agency, based upon the recommendations of such State, the Administrator, and upon any additional evidence, if any, presented to the agency at the hearing, shall condition such license or permit in such manner as may be necessary to insure compliance with applicable water quality requirements. If the imposition of conditions cannot insure such compliance such agency shall not issue such license or permit.

"(3) The certification obtained pursuant to paragraph (1) of this subsection with respect to the construction of any facility shall fulfill the requirements of this subsection with respect to certification in connection with any other Federal license or permit required for the operation of such facility unless, after notice to the certifying State, agency, or Administrator, as the case may be, which shall be given by the Federal agency to whom application is made for such operating license or permit, the State, or if appropriate, the interstate agency or the Administrator, notifies such agency within sixty days after receipt of such notice that there is no longer reasonable assurance that there will be compliance with the applicable provisions of sections 301, 302, 306, and 307 of this Act because of changes since the construction license or permit certification was issued in (A) the construction or operation of the facility, (B) the characteristics of the waters into which such discharge is made, (C) the water quality criteria applicable to such waters or (D) applicable effluent limitations or other requirements. This paragraph shall be inapplicable in any case where the applicant for such operating license or permit has failed to provide the certifying State, or, if appropriate, the interstate agency or the Administrator, with notice of any proposed changes in the construction or operation of the facility with respect to which a construction license or permit has been granted, which changes may result in violation of section 301, 302, 306, or 307 of this Act.

"(4) Prior to the initial operation of any federally licensed or permitted facility or activity which may result in any discharge into the navigable waters and with respect to which a certification has been obtained pursuant to paragraph (1) of this subsection, which facility or activity is not subject to a Federal operating license or permit, the licensee or permittee shall provide

an opportunity for such certifying State, or, if appropriate, the interstate agency or the Administrator to review the manner in which the facility or activity shall be operated or conducted for the purposes of assuring that applicable effluent limitations or other limitations or other applicable water quality requirements will not be violated. Upon notification by the certifying State, or if appropriate, the interstate agency or the Administrator that the operation of any such federally licensed or permitted facility or activity will violate applicable effluent limitations or other limitations or other water quality requirements such Federal agency may, after public hearing, suspend such license or permit. If such license or permit is suspended, it shall remain suspended until notification is received from the certifying State, agency, or Administrator, as the case may be, that there is reasonable assurance that such facility or activity will not violate the applicable provisions of section 301, 302, 306, or 307 of this Act.

"(5) Any Federal license or permit with respect to which a certification has been obtained under paragraph (1) of this subsection may be suspended or revoked by the Federal agency issuing such license or permit upon the entering of a judgment under this Act that such facility or activity has been operated in violation of the applicable provisions of section 301, 302, 306, or 307 of this Act.

"(6) No Federal agency shall be deemed to be an applicant for the purposes of this subsection.

"(7) Except with respect to a permit issued under section 402 of this Act, in any case where actual construction of a facility has been lawfully commenced prior to April 3, 1970, no certification shall be required under this subsection for a license or permit issued after

April 3, 1970, to operate such facility, except that any such license or permit issued without certification shall terminate April 3, 1973, unless prior to such termination date the person having such license or permit submits to the Federal agency which issued such license or permit a certification and otherwise meets the requirements of this section.

"(b) Nothing in this section shall be construed to limit the authority of any department or agency pursuant to any other provision of law to require compliance with any applicable water quality requirements. The Administrator shall, upon the request of any Federal department or agency, or State or interstate agency, or applicant, provide, for the purpose of this section, any relevant information on applicable effluent limitations, or other limitations, standards, regulations, or requirements, or water quality criteria, and shall, when requested by any such department or agency or State or interstate agency, or applicant, comment on any methods to comply with such limitations, standards, regulations, requirements, or criteria.

"(c) In order to implement the provisions of this section, the Secretary of the Army, acting through the Chief of Engineers, is authorized, if he deems it to be in the public interest, to permit the use of spoil disposal areas under his jurisdiction by Federal licensees or permittees, and to make an appropriate charge for such use. Moneys received from such licensees or permittees shall be deposited in the Treasury as miscellaneous receipts.

"(d) Any certification provided under this section shall set forth any effluent limitations and other limitations, and monitoring requirements necessary to assure that any applicant for a Federal license or permit will comply with

any applicable effluent limitations and other limitations, under section 301 or 302 of this Act, standard of performance under section 306 of this Act, or prohibition, effluent standard, or pretreatment standard under section 307 of this Act, and with any other appropriate requirement of State law set forth in such certification, and shall become a condition on any Federal license or permit subject to the provisions of this section.

Section 402, 33 U.S.C. § 1342, states:

"Sec. 402. (a)(1) Except as provided in sections 318 and 404 of this Act, the Administrator may, after opportunity for public hearing, issue a permit for the discharge of any pollutant, or combination of pollutants, notwithstanding section 301(a), upon condition that such discharge will meet either all applicable requirements under sections 301, 302, 306, 307, 308, and 403 of this Act, or prior to the taking of necessary implementing actions relating to all such requirements, such conditions as the Administrator determines are necessary to carry out the provisions of this Act.

"(2) The Administrator shall prescribe conditions for such permits to assure compliance with the requirements of paragraph (1) of this subsection, including conditions on data and information collection, reporting, and such other requirements as he deems appropriate.

"(3) The permit program of the Administrator under paragraph (1) of this subsection, and permits issued thereunder, shall be subject to the same terms, conditions, and requirements as apply to a State permit program and permits issued thereunder under subsection (b) of this section.

"(4) All permits for discharges into the navigable waters issued pursuant to section 13 of the Act of March

3, 1899, shall be deemed to be permits issued under this title, and permits issued under this title shall be deemed to be permits issued under section 13 of the Act of March 3, 1899, and shall continue in force and effect for their term unless revoked, modified, or suspended in accordance with the provisions of this Act.

"(5) No permit for a discharge into the navigable waters shall be issued under section 13 of the Act of March 3, 1899, after the date of enactment of this title. Each application for a permit under section 13 of the Act of March 3, 1899, pending on the date of enactment of this Act shall be deemed to be an application for a permit under this section. The Administrator shall authorize a State, which he determines has the capability of administering a permit program which will carry out the objective of this Act, to issue permits for discharges into the navigable waters within the jurisdiction of such State. The Administrator may exercise the authority granted him by the preceding sentence only during the period which begins on the date of enactment of this Act and ends either on the ninetieth day after the date of the first promulgation of guidelines required by section 304(h)(2) of this Act, or the date of approval by the Administrator of a permit program for such State under subsection (b) of this section, whichever date first occurs, and no such authorization to a State shall extend beyond the last day of such period. Each such permit shall be subject to such conditions as the Administrator determines are necessary to carry out the provisions of this Act. No such permit shall issue if the Administrator objects to such issuance.

"(b) At any time after the promulgation of the guidelines required by subsection (h)(2) of section 304 of this Act, the Governor of each State desiring to administer its own permit program for discharges into navigable

waters within its jurisdiction may submit to the Administrator a full and complete description of the program it proposes to establish and administer under State law or under an interstate compact. In addition, such State shall submit a statement from the attorney general (or the attorney for those State water pollution control agencies which have independent legal counsel), or from the chief legal officer in the case of an interstate agency, that the laws of such State, or the interstate compact, as the case may be, provide adequate authority to carry out the described program. The Administrator shall approve each such submitted program unless he determines that adequate authority does not exist:

"(1) To issue permits which—

"(A) apply, and insure compliance with, any applicable requirements of sections 301, 302, 306, 307, and 403;

"(B) are for fixed terms not exceeding five years; and

"(C) can be terminated or modified for cause including, but not limited to, the following:

"(i) violation of any condition of the permit;

"(ii) obtaining a permit by misrepresentation, or failure to disclose fully all relevant facts;

"(iii) change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;

"(D) control the disposal of pollutants into wells;

"(2)(A) To issue permits which apply, and insure compliance with, all applicable requirements of section 308 of this Act, or

"(B) To inspect, monitor, enter, and require reports to at least the same extent as required in section 308 of this Act;

"(3) To insure that the public, and any other State the waters of which may be affected, receive notice of each application for a permit and to provide an opportunity for public hearing before a ruling on each such application;

"(4) To insure that the Administrator receives notice of each application (including a copy thereof) for a permit;

"(5) To insure that any State (other than the permitting State), whose waters may be affected by the issuance of a permit may submit written recommendations to the permitting State (and the Administrator) with respect to any permit application and, if any part of such written recommendations are not accepted by the permitting State, that the permitting State will notify such affected State (and the Administrator) in writing of its failure to so accept such recommendations together with its reasons for so doing;

"(6) To insure that no permit will be issued if, in the judgment of the Secretary of the Army acting through the Chief of Engineers, after consultation with the Secretary of the department in which the Coast Guard is operating, anchorage and navigation of any of the navigable waters would be substantially impaired thereby;

"(7) To abate violations of the permit or the permit program, including civil and criminal penalties and other ways and means of enforcement;

"(8) To insure that any permit for a discharge from a publicly owned treatment works includes conditions to require adequate notice to the permitting agency of (A) new introductions into such works of pollutants from any source which would be a new source as defined in section 306 if such source were discharging pollutants, (B) new introductions of pollutants into such works from a source which would be subject to section 301 if it were discharging such pollutants, or (C) a substantial change in volume or character of pollutants being introduced into such works by a source introducing pollutants into such works at the time of issuance of the permit. Such notice shall include information on the quality and quantity of effluent to be introduced into such treatment works and any anticipated impact of such change in the quantity or quality of effluent to be discharged from such publicly owned treatment works; and

"(9) To insure that any industrial user of any publicly owned treatment works will comply with sections 204(b), 307, and 308.

"(c)(1) Not later than ninety days after the date on which a State has submitted a program (or revision thereof) pursuant to subsection (b) of this section, the Administrator shall suspend the issuance of permits under subsection (a) of this section as to those navigable waters subject to such program unless he determines that the State permit program does not meet the requirements of subsection (b) of this section or does not conform to the guidelines issued under section 304(h)(2) of this Act. If the Administrator so determines, he shall notify the State of any revisions or modifications necessary to conform to such requirements or guidelines.

"(2) Any State permit program under this section shall at all times be in accordance with this section and guidelines promulgated pursuant to section 304(h)(2) of this Act.

"(3) Whenever the Administrator determines after public hearing that a State is not administering a program approved under this section in accordance with requirements of this section, he shall so notify the State and, if appropriate corrective action is not taken within a reasonable time, not to exceed ninety days, the Administrator shall withdraw approval of such program. The Administrator shall not withdraw approval of any such program unless he shall first have notified the State, and made public, in writing, the reasons for such withdrawal.

"(d)(1) Each State shall transmit to the Administrator a copy of each permit application received by such State and provide notice to the Administrator of every action related to the consideration of such permit application, including each permit proposed to be issued by such State.

"(2) No permit shall issue (A) if the Administrator within ninety days of the date of his notification under subsection (b)(5) of this section objects in writing to the issuance of such permit, or (B) if the Administrator within ninety days of the date of transmittal of the proposed permit by the State objects in writing to the issuance of such permit as being outside the guidelines and requirements of this Act.

"(3) The Administrator may, as to any permit application, waive paragraph (2) of this subsection.

"(e) In accordance with guidelines promulgated pursuant to subsection (h)(2) of section 304 of this Act, the Administrator is authorized to waive the requirements of subsection (d) of this section at the time he approves a program pursuant to subsection (b) of this section for any category (including any class, type, or size within such category) of point sources within the State submitting such program.

"(f) The Administrator shall promulgate regulations establishing categories of point sources which he determines shall not be subject to the requirements of subsection (d) of this section in any State with a program approved pursuant to subsection (b) of this section. The Administrator may distinguish among classes, types, and sizes within any category of point sources.

"(g) Any permit issued under this section for the discharge of pollutants into the navigable waters from a vessel or other floating craft shall be subject to any applicable regulations promulgated by the Secretary of the department in which the Coast Guard is operating, establishing specifications for safe transportation, handling, carriage, storage, and stowage of pollutants.

"(h) In the event any condition of a permit for discharges from a treatment works (as defined in section 212 of this Act) which is publicly owned is violated, a State with a program approved under subsection (b) of this section or the Administrator, where no State program is approved, may proceed in a court of competent jurisdiction to restrict or prohibit the introduction of any pollutant into such treatment works by a source not utilizing such treatment works prior to the finding that such condition was violated.

"(i) Nothing in this section shall be construed to limit the authority of the Administrator to take action pursuant to section 309 of this Act.

"(j) A copy of each permit application and each permit issued under this section shall be available to the public. Such permit application or permit, or portion thereof, shall further be available on request for the purpose of reproduction.

"(k) Compliance with a permit issued pursuant to this section shall be deemed compliance, for purposes of

sections 309 and 505, with sections 301, 302, 306, 307, and 403, except any standard imposed under section 307 for a toxic pollutant injurious to human health. Until December 31, 1974, in any case where a permit for discharge has been applied for pursuant to this section, but final administrative disposition of such application has not been made, such discharge shall not be a violation of (1) section 301, 306, or 402 of this Act, or (2) section 13 of the Act of March 3, 1899, unless the Administrator or other plaintiff proves that final administrative disposition of such application has not been made because of the failure of the applicant to furnish information reasonably required or requested in order to process the application. For the 180-day period beginning on the date of enactment of the Federal Water Pollution Control Act Amendments of 1972, in the case of any point source discharging any pollutant or combination of pollutants immediately prior to such date of enactment which source is not subject to section 13 of the Act of March 3, 1899, the discharge by such source shall not be a violation of this Act if such a source applies for a permit for discharge pursuant to this section within such 180-day period.

Section 502, 33 U.S.C. §1362, states:

"Sec. 502. Except as otherwise specifically provided, when used in this Act:

"(1) The term 'State water pollution control agency' means the State agency designated by the Governor having responsibility for enforcing State laws relating to the abatement of pollution.

"(2) The term 'interstate agency' means an agency of two or more States established by or pursuant to an agreement or compact approved by the Congress, or any other agency of two or more States, having substantial

powers or duties pertaining to the control of pollution as determined and approved by the Administrator.

"(3) The term 'State' means a State, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Trust Territory of the Pacific Islands.

"(4) The term 'municipality' means a city, town, borough, county, parish, district, association, or other public body created by or pursuant to State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of this Act.

"(5) The term 'person' means an individual, corporation, partnership, association, State, municipality, commission, or political subdivision of a State, or any interstate body.

"(6) The term 'pollutant' means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. This term does not mean (A) 'sewage from vessels' within the meaning of section 312 of this Act; or (B) water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil or gas production and disposed of in a well, if the well used either to facilitate production or for disposal purposes is approved by authority of the State in which the well is located, and if such State determines that such injection or disposal will not result in the degradation of ground or surface water resources.

"(7) The term 'navigable waters' means the waters of the United States, including the territorial seas.

"(8) The term 'territorial seas' means the belt of the seas measured from the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters, and extending seaward a distance of three miles.

"(9) The term 'contiguous zone' means the entire zone established or to be established by the United States under article 24 of the Convention of the Territorial Sea and the Contiguous Zone.

"(10) The term 'ocean' means any portion of the high seas beyond the contiguous zone.

"(11) The term 'effluent limitation' means any restriction established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance.

"(12) The term 'discharge of a pollutant' and the term 'discharge of pollutants' each means (A) any addition of any pollutant to navigable waters from any point source, (B) any addition of any pollutant to the waters of the contiguous zone or the ocean from any point source other than a vessel or other floating craft.

"(13) The term 'toxic pollutant' means those pollutants, or combinations of pollutants, including disease-causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will, on the basis of

information available to the Administrator, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring.

"(14) The term 'point source' means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.

"(15) The term 'biological monitoring' shall mean the determination of the effects on aquatic life, including accumulation of pollutants in tissue, in receiving waters due to the discharge of pollutants (A) by techniques and procedures, including sampling of organisms representative of appropriate levels of the food chain appropriate to the volume and the physical, chemical, and biological characteristics of the effluent, and (B) at appropriate frequencies and locations.

"(16) The term 'discharge' when used without qualification includes a discharge of a pollutant, and a discharge of pollutants.

"(17) The term 'schedule of compliance' means a schedule of remedial measures including an enforceable sequence of actions or operations leading to compliance with an effluent limitation, other limitation, prohibition, or standard.

"(18) The term 'industrial user' means those industries identified in the Standard Industrial Classification Manual, Bureau of the Budget, 1967, as amended and supplemented, under the category 'Division D—Manufacturing' and such other classes of significant waste

producers as, by regulation, the Administrator deems appropriate.

"(19) The term 'pollution' means the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water.

Section 505, 33 U.S.C. § 1365, states:

"Sec. 505. (a) Except as provided in subsection (b) of this section, any citizen may commence a civil action on his own behalf—

"(1) against any person (including (i) the United States, and (ii) any other governmental instrumentality or agency to the extent permitted by the eleventh amendment to the Constitution) who is alleged to be in violation of (A) an effluent standard or limitation under this Act or (B) an order issued by the Administrator or a State with respect to such a standard or limitation, or

"(2) against the Administrator where there is alleged a failure of the Administrator to perform any act or duty under this Act which is not discretionary with the Administrator.

The district courts shall have jurisdiction, without regard to the amount in controversy or the citizenship of the parties, to enforce such an effluent standard or limitation, or such an order, or to order the Administrator to perform such act or duty, as the case may be, and to apply any appropriate civil penalties under section 309(d) of this Act.

"(b) No action may be commenced—

"(1) under subsection (a)(1) of this section—

"(A) prior to sixty days after the plaintiff has given notice of the alleged violation (i) to the Administrator, (ii) to the State in which the

alleged violation occurs, and (iii) to any alleged violator of the standard, limitation, or order, or

"(B) if the Administrator or State has commenced and is diligently prosecuting a civil or criminal action in a court of the United States, or a State to require compliance with the standard, limitation, or order, but in any such action in a court of the United States any citizen may intervene as a matter of right.

"(2) under subsection (a)(2) of this section prior to sixty days after the plaintiff has given notice of such action to the Administrator,

except that such action may be brought immediately after such notification in the case of an action under this section respecting a violation of sections 306 and 307(a) of this Act. Notice under this subsection shall be given in such manner as the Administrator shall prescribe by regulation.

"(c)(1) Any action respecting a violation by a discharge source of an effluent standard or limitation or an order respecting such standard or limitation may be brought under this section only in the judicial district in which such source is located.

"(2) In such action under this section, the Administrator, if not a party, may intervene as a matter of right.

"(d) The court, in issuing any final order in any action brought pursuant to this section, may award costs of litigation (including reasonable attorney and expert witness fees) to any party, whenever the court determines such award is appropriate. The court may, if a temporary restraining order or preliminary injunction is sought, require the filing of a bond or equivalent security in accordance with the Federal Rules of Civil Procedure.

"(e) Nothing in this section shall restrict any right which any person (or class of persons) may have under any statute or common law to seek enforcement of any effluent standard or limitation or to seek any other relief (including relief against the Administrator or a State agency).

"(f) For purposes of this section, the term 'effluent standard or limitation under this Act' means (1) effective July 1, 1973, an unlawful act under subsection (a) of section 301 of this Act; (2) an effluent limitation or other limitation under section 301 or 302 of this Act; (3) standard of performance under section 306 of this Act; (4) prohibition, effluent standard or pretreatment standards under section 307 of this Act; (5) certification under section 401 of this Act; or (6) a permit or condition thereof issued under section 402 of this Act, which is in effect under this Act (including a requirement applicable by reason of section 313 of this Act).

"(g) For the purposes of this section the term 'citizen' means a person or persons having an interest which is or may be adversely affected.

"(h) A Governor of a State may commence a civil action under subsection (a), without regard to the limitations of subsection (b) of this section, against the Administrator where there is alleged a failure of the Administrator to enforce an effluent standard or limitation under this Act the violation of which is occurring in another State and is causing an adverse effect on the public health or welfare in his State, or is causing a violation of any water quality requirement in his State.

Section 509, 33 U.S.C. §1369, states:

"Sec. 509. (a)(1) For purposes of obtaining information under section 305 of this Act, or carrying out section 507(e) of this Act, the Administrator may issue subpenas for the attendance and testimony of witnesses and the production of relevant papers, books, and documents, and he may administer oaths. Except for effluent data, upon a showing satisfactory to the Administrator that such papers, books, documents, or information or particular part thereof, if made public, would divulge trade secrets or secret processes, the Administrator shall consider such record, report, or information or particular portion thereof confidential in accordance with the purposes of section 1905 of title 18 of the United States Code, except that such paper, book, document, or information may be disclosed to other officers, employees, or authorized representatives of the United States concerned with carrying out this Act, or when relevant in any proceeding under this Act. Witnesses summoned shall be paid the same fees and mileage that are paid witnesses in the courts of the United States. In case of contumacy or refusal to obey a subpena served upon any person under this subsection, the district court of the United States for any district in which such person is found or resides or transacts business, upon application by the United States and after notice to such person, shall have jurisdiction to issue an order requiring such person to appear and give testimony before the Administrator, to appear and produce papers, books, and documents before the Administrator, or both, and any failure to obey such order of the court may be punished by such court as a contempt thereof.

"(2) The district courts of the United States are authorized, upon application by the Administrator, to

issue subpenas for attendance and testimony of witnesses and the production of relevant papers, books, and documents, for purposes of obtaining information under sections 304 (b) and (c) of this Act. Any papers, books, documents, or other information or part thereof, obtained by reason of such a subpena shall be subject to the same requirements as are provided in paragraph (1) of this subsection.

"(b)(1) Review of the Administrator's action (A) in promulgating any standard of performance under section 306, (B) in making any determination pursuant to section 306(b)(1)(C), (C) in promulgating any effluent standard, prohibition, or treatment standard under section 307, (D) in making any determination as to a State permit program submitted under section 402(b), (E) in approving or promulgating any effluent limitation or limitation under section 301, 302, or 306, and (F) in issuing or denying any permit under section 402, may be had by any interested person in the Circuit Court of Appeals of the United States for the Federal judicial district in which such person resides or transacts such business upon application by such person. Any such application shall be made within ninety days from the date of such determination, approval, promulgation, issuance or denial, or after such date only if such application is based solely on grounds which arose after such ninetieth day.

"(2) Action of the Administrator with respect to which review could have been obtained under paragraph (1) of this subsection shall not be subject to judicial review in any civil or criminal proceeding for enforcement.

"(c) In any judicial proceeding brought under subsection (b) of this section in which review is sought of a determination under this Act required to be made on the

record after notice and opportunity for hearing, if any party applies to the court for leave to adduce additional evidence, and shows to the satisfaction of the court that such additional evidence is material and that there were reasonable grounds for the failure to adduce such evidence in the proceeding before the Administrator, the court may order such additional evidence (and evidence in rebuttal thereof) to be taken before the Administrator, in such manner and upon such terms and conditions as the court may deem proper. The Administrator may modify his findings as to the facts, or make new findings, by reason of the additional evidence so taken and he shall file such modified or new findings, and his recommendation, if any, for the modification or setting aside of his original determination, with the return of such additional evidence.

APPENDIX D

UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY
Washington, D.C. 20460

March 25, 1974

Office of
Enforcement and General Counsel

Thomas H. Truitt, Esquire
Truitt and Fabrikant
910 Seventeenth Street, N.W.
Washington, D.C. 20006

Dear Mr. Truitt:

This is in response to your March 18, 1974, letter requesting a hearing on the effluent limitations guidelines for the builders paper and board manufacturing point source category and the pulp, paper and paperboard manufacturing point source category which were proposed on January 14 and January 15, 1974, pursuant to Sections 301 and 304 of the Federal Water Pollution Control Act, as amended. As you know, Water Pollution Control Act, as amended. As you know, sections 301 and 304 of the FWPCA do not require that a hearing be held prior to promulgation of effluent limitation guidelines. The general rulemaking requirements of Section 553 of the Administrative Procedure Act only require that notice and opportunity to comment on proposed regulations be provided. A substantial opportunity for comments by the industry has been provided both in connection with the draft development

document, which was made available for review and comment in July, 1973, and in connection with the proposed regulations. Moreover, a hearing was held on these guidelines by the Effluent Standards and Water Quality Information Advisory Committee. For these reasons we do not believe that a hearing is required before promulgation of these guidelines.

However, because of your concern over the guidelines and the interest of your client in discussing these matters with EPA, we believe that it is possible to hold a technical meeting on the proposed regulations which would permit you to explain orally your comments on the guidelines and to discuss the matters with EPA personnel. Because of the time constraints imposed by the court order, it is necessary that such a meeting be held quite soon. We have scheduled it for Thursday, April 4, in Room 1112, Crystal Mall Building #2, 1921 Jefferson Davis Highway, Arlington, Virginia, beginning at 8:00 a.m. We have notified all individuals who commented on the proposed guidelines by telegram to advise them of this meeting and of their opportunity to attend.

It will be necessary for all participants to cooperate in making the meeting function smoothly. We will only be able to hold the meeting for a day and we suggest that the various parties consolidate their points of discussion and have them presented by one person, such as a lead counsel. We also request that comments which have been adequately dealt with in written comments not be repeated so that the meeting serve to develop further information and clarify existing points of confusion. I must emphasize that while EPA personnel will be available to discuss the comments and questions raised by the industry, this is not an adjudicatory hearing where

EPA personnel, or industry representatives, will be subjected to cross-examination regarding their statements.

I believe that if all parties cooperate and follow this format, an effective exchange of information can occur which will satisfy your request but which will not impede compliance with the court order. If you have any questions about this matter, please get in touch with Bill Frick.

Very truly yours,

/s/Robert V. Zener
for Alan G. Kirk II
Assistant Administrator for Enforcement
and General Counsel (EG-329)

Supreme Court, U. S.
FILED
SEP 27 1976
MICHAEL RODAK, JR., CLERK

No. 75-978

IN THE
Supreme Court of the United States
OCTOBER TERM, 1976

E. I. DUPONT DE NEMOURS AND COMPANY, *et al.*,
Petitioners,
v.
RUSSELL E. TRAIN, AS ADMINISTRATOR OF THE ENVIRONMENTAL PROTECTION AGENCY, *et al.*,
Respondents.

On Writ of Certiorari to the United States Court of Appeals for the Fourth Circuit

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BRIEF FOR NATURAL RESOURCES DEFENSE COUNCIL, INC. AS *AMICUS CURIAE*

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BRIEF FOR NATURAL RESOURCES DEFENSE COUNCIL, INC. AS *AMICUS CURIAE*

INTERESTS OF THE NATURAL RESOURCES DEFENSE COUNCIL

The Natural-Resources Defense Council, Inc. ("NRDC") —a national environmental organization with more than 22,000 members residing in all states and territories—has as one of its principal objectives the protection and preservation of our Nation's waters. NRDC, primarily through its Project On Clean Water, has monitored

closely the implementation of the Federal Water Pollution Control Act Amendments of 1972 ("Act"), 33 U.S.C. §§ 1251 *et seq.*, since its enactment. The legal issues involved in this case involve interpretation of the requirements and interrelationships of key provisions of the Act, particularly Sections 301, 304(b), and 402, which establish the basic regulatory scheme for abating discharges of pollution from existing point sources such as pipes, outfalls, and conduits. The basic legal issue is whether the Administrator of the Environmental Protection Agency is authorized, pursuant to Sections 301 and 304(b) of the Act, to promulgate regulations which establish national, uniform, minimum effluent limitations for carefully defined subcategories of point sources.

NRDC's interests in the issues raised by this case are of long-standing. *See*, for example, *Natural Resources Defense Council* v. *Train*, 6 ERC 1033 (D.D.C. 1973), *aff'd in part and rev'd in part*, 166 U.S. App. D.C. 312, 510 F.2d 692 (1974). This decision was the first circuit court decision which provided a detailed interpretation of Sections 301, 304(b), and 402 of the Act. The District Court's decision established a schedule for promulgating the regulations required by Section 304(b)(1)(A).

Pursuant to this schedule, as subsequently modified, EPA promulgated the effluent limitations guidelines regulations in issue in this case. These and similar regulations have been challenged by numerous industry organizations in cases which were filed and consolidated in eight of the ten U.S. Courts of Appeals. NRDC has filed *amicus curiae* briefs, which in general support EPA's position, in substantially all these cases, including the captioned case. Seven of the Courts of Appeals have rendered decisions in these cases.[1] Six of the circuits have held that EPA has authority to promulgate the regulations in issue; only one has held to the contrary.[2] Although the six circuit courts have differed in their views of what the precise form and content of these effluent limitations guidelines should be, these circuits are unanimous in holding that the Administrator is authorized by the Act to promulgate regulations which prescribe national, uniform, minimum or base-level effluent limitations as long as there is provision for granting in individual cases variances from these national limitations.[3]

NRDC has a substantial interest in ensuring that the broad and far reaching clean water objectives of the Act are achieved. This Court's decision will provide an authoritative interpretation of EPA's powers and duties for regulating and minimizing the discharge of pollutants into our Nation's waters. Regarding the issues before this Court, NRDC believes that EPA has properly interpreted and implemented its regulatory authority under

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[1] CPC International Inc. v. Train, 515 F.2d 1032 (8th Cir. 1975), *and* —— F.2d ——, 9 ERC —— (8th Cir. 1976); American Meat Institute v. EPA, 526 F.2d 442 (7th Cir. 1975); American Iron & Steel Institute v. EPA, 526 F.2d 1027 (3d Cir. 1975); E.I. duPont de Nemours & Co. v. Train, 528 F.2d 1136 (4th Cir. 1976) *and* —— F.2d ——, 8 ERC 1718 (4th Cir. 1976); FMC Corp. v. Train, —— F.2d ——, 8 ERC 1731 (4th Cir. 1976); Tanner's Council of America Inc. v. Train, —— F.2d ——, 8 ERC 1881 (4th Cir. 1976); Appalachian Power Co. v. Train, —— F.2d ——, 9 ERC 1033 (4th Cir. 1976); Hooker Chemicals & Plastics Corp. v. Train, —— F.2d ——, 8 ERC 1961 (2d Cir. 1976); Natural Resources Defense Council v. EPA, —— F.2d ——, 8 ERC 1988 (2d Cir. 1976); American Frozen Food Institute v. Train, —— F.2d ——, 8 ERC 1993 (D.C. Cir. 1976); American Paper Institute v. Train, —— F.2d ——, 9 ERC —— (D.C. Cir. 1976); American Petroleum Institute v. Train, 526 F.2d 1343 (10th Cir. 1975) *and* —— F.2d ——, 9 ERC —— (10th Cir. 1976).

[2] CPC International Inc. v. Train, 515 F.2d 1032 (8th Cir. 1975) (this was the first decision rendered regarding the validity of EPA's Section 301/304 effluent limitations guidelines regulations.)

[3] The Third Circuit held that EPA must also establish a range of effluent limitations guidelines in addition to a base level limitation. American Iron & Steel Institute v. EPA, 526 F.2d 1027 (3d Cir. 1975). *See* note 172 *infra*.

Sections 301, 304(b), and 402 of the Act. Moreover, as discussed in detail in this *amicus* brief, it is essential that this Court uphold EPA's authority if the clean water objectives of the Act are to be achieved. To do otherwise would substantially reduce the likelihood that discharges of pollutants to the Nation's waters from existing point sources will be significantly reduced, particularly within the time frame contemplated by Congress, would make implementation of the Act's requirements by those states with delegated responsibilities much more burdensome and difficult, and would adversely affect the public's interest in cleaning up our Nation's waters.

This *amicus* brief is being filed with the consent of the parties to this case. Copies of the written consents are filed herewith.

QUESTIONS PRESENTED

1. Whether the Administrator of the Environmental Protection Agency is authorized to establish by regulation national, uniform, minimum effluent limitations for carefully defined subcategories of point sources pursuant to Sections 301 and 304(b) of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. §§ 1311, 1314(b).

2. Whether the United States Court of Appeals has exclusive jurisdiction pursuant to Section 509 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. § 1369, to review effluent limitations guidelines regulations promulgated by the Administrator of the Environmental Protection Agency pursuant to Sections 301 and 304(b) of the Act, 33 U.S.C. §§ 1311, 1314(b).

STATEMENT OF THE CASE [4]

A.

INTRODUCTION

The basic issue in this case is whether the Administrator of the Environmental Protection Agency (EPA) acted in accordance with the purposes and requirements of the Federal Water Pollution Control Act Amendments of 1972, (the "Act" or "FWPCA") by establishing national, uniform, minimum effluent limitations for carefully defined subcategories of industrial point sources pursuant to Sections 301 and 304(b) of the Act.[5] As demonstrated in the discussion which follows, promulgation of such national, uniform effluent limitations regulations is completely consistent with the Act and is essential to achieving several of the Act's objectives.

In order to understand the conflicting statutory interpretations of EPA and the petitioners, and the implications of these interpretations for achievement of the Act's goals, it is necessary to summarize briefly the relationships of the basic statutory provisions involved in this case. Section 301(a) makes the discharge of any pollutant by any person unlawful except as allowed by permit.[6] Permits, which are issued principally under

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[4] Amicus NRDC found that Petitioners' "Statement of the Case" was incomplete and that Petitioners' "Statement" failed properly to present the history, structure, and intended operation of the FWPCA. Since proper interpretation of key provisions of the Act is in issue, amicus NRDC considered it imperative to present a careful and comprehensive statement of the case regarding the statutory issues involved.

[5] Public Law No. 92-500, Oct. 18, 1972, 86 Stat. 816, 33 U.S.C. §§ 1251 *et seq.*, 1311, 1314(b).

[6] 33 U.S.C. § 1311(a); *see* detailed discussion at pages 15-16 *infra*.

Section 402,[7] are issued only to those dischargers who comply with the requirements established by the Act.[8] These requirements include the effluent limitations involved in this case.[9] Effluent limitations for new point sources are defined and established by Section 306.[10] For existing point sources, both industrial and municipal, effluent limitations are established by Section 301 as defined pursuant to Sections 304(b) and 304(d).[11] Permits may be issued by EPA or by those states whose permit programs have been approved by EPA[12] and which comply with the requirements of the Act, including the Section 301 and Section 306 effluent limitations.[13]

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[7] The requirements of Section 402 govern the issuance of permits for discharges of pollutants by point sources except to the extent that Section 404 (which governs, in part, the discharge of dredged and fill material into navigable waters) or Section 318 (which governs the discharge of pollutants associated with an approved aquaculture project) apply. 33 U.S.C. § 1342(a)(1).

[8] 33 U.S.C. § 1342; *see* detailed discussion at pages 18-24 *infra.*

[9] The phrase "effluent limitations" is used in this brief in referring to, *inter alia*, Section 301 effluent limitations and Section 306 standards of performance, a use which is consistent with the Act's definition of the term "effluent limitation." *See* Section 502(11), 33 U.S.C. § 1362(11). For existing point sources, the statutory phrase is "effluent limitations," 33 U.S.C. §§ 1311(b)(1)(A), (e). The requirements which such effluent limitations must meet are "best practicable control technology currently available" for mid-1977, and "best available technology economically achievable" for mid-1983. 33 U.S.C. §§ 1311(b)(1)(A), (b)(2)(A). For new point sources, the statutory phrase is "standard of performance," and the requirement is "best available demonstrated control technology," 33 U.S.C. § 1316(a)(1).

[10] 33 U.S.C. § 1316.

[11] 33 U.S.C. §§ 1314(b), 1314(d), 1311(b)(1)(A); *see* detailed discussion at pages 14-19 *infra.*

[12] 33 U.S.C. § 1342(b); *see* detailed discussion at pages 18-19 *infra.*

[13] 33 U.S.C. § 1342(b); *see* detailed discussion at pages 18-24 *infra.*

The regulations establishing Section 301 effluent limitations for classes and categories of industrial point sources are reviewable in the U.S. Court of Appeals pursuant to Section 509(b).[14] Enforcement of individual permit conditions is by suit in a U.S. District Court pursuant to Sections 309[15] or 505.[16]

At its heart this statutory scheme for abating industrial point source pollution is based on federally established effluent limitations which are applied and enforced by EPA or by the states pursuant to federal oversight and control.

Accordingly, in order to meet its obligations under the Act, EPA initiated rulemaking proceedings by which it developed and promulgated regulations establishing effluent limitations and guidelines, standards of performance, and pretreatment standards pursuant to Sections 301, 304(b) & (c), 306(b) & (c), and 307(c),[17] for approximately 40 categories of industrial point sources. One of these categories is the inorganic chemicals manufacturing point source category involved in this proceeding (hereafter "inorganic chemicals category").

Petitioners contend that EPA is not authorized to establish by regulation national, uniform, minimum Section 301 effluent limitations. Instead, petitioners assert that effluent limitations for existing point sources can be established only in each individual permit proceeding,

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[14] 33 U.S.C. § 1369(b).

[15] 33 U.S.C. § 1319 (enforcement by federal authorities); *see* detailed discussion at page 19 *infra.*

[16] 33 U.S.C. § 1365 (enforcement by citizen suits); *see* detailed discussion at page 19 *infra.*

[17] *See* "Advance Notice of Public Review Procedures," 38 Fed. Reg. 21202 (1973), App. 21-42, as well as pertinent *Federal Register* notices regarding the proceedings by which the contested regulations were developed and promulgated; 39 Fed. Reg. 9611 (1974), App. B; 39 Fed. Reg. 28174 (1973), App. 60-151.

Pet. Brief 6, 28, 49-61, of which there will be approximately 40,000.[18]

If petitioners' interpretation were to prevail, one of the basic objectives of the Act which Congress devised after a quarter century of ineffective federal water pollution control legislation would be defeated: creating national, uniform, point source effluent limitations which are to be made increasingly more stringent over time, to the end that "the discharge of pollutants into the navigable waters be eliminated by 1985." [19] Petitioners' interpretation would require that the basic effluent limitations for regulating existing point source discharges be established on an *ad hoc*, individualized permit-by-permit basis, often by each of the 27 states which have had their permit programs approved. The practical result of petitioners' contention would be to render EPA's general rulemaking effort invalid—an effort which continued for almost eighteen months with extensive participation by petitioners,[20] which developed a large amount of complex technical data, and which produced careful analyses and conclusions performed by experts. Presumably, under petitioners' interpretation, the detailed body of data and analysis developed during EPA's rulemaking proceeding could be introduced into the record of each permit proceeding and the permit issuing authority would then be obligated in each case to consider and analyze this data before prescribing a numerical effluent limitation. In effect, petitioners' interpretation would revive many of the unsatisfactory aspects of prior

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[18] EPA, EPA ENFORCEMENT: A PROGRESS REPORT—DECEMBER 1974 TO DECEMBER 1975, at 91 (1976).

[19] Section 101(a)(1), 33 U.S.C. § 1251(a)(1).

[20] *See* documents cited in note 17 *supra* which discuss the rulemaking process. Petitioners' active participation in the rulemaking process is evident from the administrative record and is discussed in *Pet. Brief* 13-22.

federal water pollution control legislation which Congress found to be ineffective and inadequate,[21] such as an individualized case-by-case approach for establishing pollutant discharge limitations.

Because petitioners' discussion of the statutory framework is inadequate and a proper understanding of the Act's structure is essential to proper resolution of this case, a detailed discussion of the Act's comprehensive, carefully integrated mandatory program for water pollution control is presented in Part B below. Then, in Part C, the rulemaking proceeding by which the contested regulations were developed and promulgated is briefly described.

B.

FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972

1. Background Of The Act

The Federal Water Pollution Control Act Amendments of 1972 [22] culminates 26 years of effort by the Congress "to bring to reality an effective properly funded program to restore and enhance the quality of our waters and to insure their future as a lasting national asset." [23] Congress recognized that a basic problem with prior legisla-

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[21] *See, e.g.*, statement of Representative Vanik, quoted in note 28 *infra*.

[22] 33 U.S.C. §§ 1251 *et seq.* (hereafter "Act" or "FWPCA").

[23] H.R. REP. No. 92-911, 92d Cong., 2d Sess. 66 (1972); *Leg. Hist.* 753. The Senate Committee on Public Works published a detailed two-volume legislative history of the Act. It contains the Act, the President's veto message, excerpts from the Conference, Senate, and House Reports, and excerpts from Senate and House debates. SENATE COMMITTEE ON PUBLIC WORKS (LIBRARY OF CONGRESS), A LEGISLATIVE HISTORY OF THE WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972, 93d Cong., 1st Sess. (Jan. 1973) (Comm. Print) (2 vols.). Citations to this compilation of the legislative history will be: "*Leg. Hist.* ———."

tion was that national, uniform, mandatory water pollution control standards had not been established.[24] As a result, industries could shop among local jurisdictions for those which for reasons of ecnomic development, local dependence on a dominant industry, or lack of concern for the effects of pollution would grant the industry permission to discharge substantial amounts of pollutants into the nation's waters, sometimes at rates exceeding those allowed by neighboring states and to the detriment of downstream states. As a result, Congress repeatedly emphasized in the legislative history the importance of establishing nationally uniform effluent limitations.[25]

National uniformity was the first consideration which Senator Muskie, floor leader for the bill and principal author of the Act, laid before the Senate during its final debate on the bill:

> "Senators will recall from the November debate on the Senate bill that there were three essential elements to it: Uniformity, finality, and enforceability. Without these elements a new law would not constitute any improvement on the old; we would not bring a conference agreement to the floor without them.
>
> "As far as uniformity and finality are concerned, the conference agreement provides that each polluter within a category or class of industrial sources will be required to achieve nationally uniform effluent limitations based on 'best practicable' technology no later than July 1, 1977. This does not mean that the Administrator cannot require compliance by an earlier date; it means that these limitations must be achieved no later than July 1, 1977, that they must be uniform, and that they will be final upon the issuance of a permit under section 402 of the bill." [26]

[24] *See, e.g.*, the legislative history cited in notes 28 and 160 *infra* and the quotations from the legislative history at pages 10-11, 13, 17, 58-61 *infra*.

[25] *Id*

To achieve this "uniformity" objective, Congress established a series of national water pollution control requirements, the first of which is the 1977 effluent limitation requirement based on the "best practicable" control technology noted in the quotation. Congress then devised a comprehensive, carefully integrated water pollution control program which applied these uniform effluent limitations on an increasingly strict basis to dischargers. At the same time, Congress recognized that significant differences exist among dischargers and developed methods for accounting for these differences while applying the system of uniform limitations: EPA was instructed to develop the limitations for specific, carefully defined classes and categories of point sources which are similar in their control technology requirements.[27] Finally, Congress established a detailed enforcement system which is based upon and ensures compliance with nationally uniform effluent limitations. As will be seen, the keystone of this system is Section 301, and the proper interpretation of this section and of its relationship to other provisions of the Act, particularly Sections 304(b) and 402, is the basic legal issue in this case.

It is important to emphasize at the outset two factors which are critical to proper understanding of the portions of the Act involved in this case—both involve substantial shifts from the water pollution control approach of previous legislation; both involve more effective federal control. The first is Congress' determination to limit the discretion of those administering the Act. As Senator Randolph, Chairman of the Senate Committee on Public Works, stated:

[26] *Leg. Hist.* 162.

[27] *See, e.g.*, Sections 301(b)(2)(A), 304(b)(1)(A), 33 U.S.C. §§ 1311(b)(2)(A), 1314(b)(1)(A).

". . . I stress very strongly that Congress has become very specific on the steps it wants taken with regard to environmental protection. We have written into law precise standards and definite guidelines on how the environment should be protected. We have done more than just provide broad directives for administrators to follow . . . .

"In the past, too many of our environmental laws have contained vague generalities. What we are attempting to do now is provide laws that can be administered with certainty and precision. I think that is what the American people expect that we do." [28]

The second is Congress' determination to prescribe enforceable federal effluent limitations and other requirements. Perhaps the most important innovation of the 1972 Act is the adoption of technology-based, nationally uniform effluent limitations to control pollution from point sources [29] instead of sole reliance upon water quality standards. Congress found that the 1965 water quality standards program was "limited in its success" [30] and adopted "this substantial change [to technology-based effluent limitations] because of the great difficulty associated with establishing reliable and enforceable precise effluent limitations on the basis of a given stream qual-

[28] *Leg. Hist.* 1272 (Senate debate on passage of Senate bill). It is important to note that a principal motivating force for the 1972 Amendments was extreme dissatisfaction with the inadequacies of existing laws. For example, during House debate on the bill, Representative Vanik stated:

"Amendments and improvements in our water pollution control laws are desperately needed now, because, as I have just stated, conditions are getting worse, and second, the *present control efforts are administratively unworkable and philosophically faulty.*" *Leg. Hist.* 494 (emphasis added).

See also Leg. Hist. 99 (Statement of Representative Jones); S. REP. No. 92-414, 92d Cong., 1st Sess. 4-7 (1971), *Leg. Hist.* 1422-25.

[29] *See* S. REP. No. 92-414, note 28, *supra* at 7-8, *Leg. Hist.* 1425-26.

[30] S. REP. No. 92-414, note 28, *supra* at 8, *Leg. Hist.* 1426.

ity." [31] Congress determined that "precise effluent limitations" which would be "defendable in court" [32] were necessary to cleaning up the nation's waters. Accordingly:

"Under this Act the basis of pollution prevention and elimination will be the application of effluent limitations. Water quality will be a measure of program effectiveness and performance, not a means of elimination and enforcement.

"The Committee recommends *the change to effluent limits as the best available mechanism to control water pollution.* With effluent limits, the Administrator can require the best control technology; he need not search for a precise link between pollution and water quality." [33]

Congress also determined that effluent limitations must be uniform across the nation to prevent competitive disadvantage from occuring among existing industries and to prevent industries from "forum shopping" among the states.[34] Congress was quite concerned with the prob-

[31] *Id.*

[32] *Id.*

[33] *Id.* (emphasis added).

[34] Moreover, when national, uniform effluent limitation standards for new sources exist, different state effluent limitations for existing sources may still encourage industry to forum shop among the states for jurisdictions with weak water pollution control programs.

First, a "new source" exists only after "publication of proposed regulations prescribing a standard of performance . . . which will be applicable to such source . . . ." Section 306(a)(2), 33 U.S.C. § 1316(a)(2). Prior to such time, existing source effluent limitations apply to all industrial point sources, whether new or existing.

Second, the Act contemplates that EPA will develop Section 301 effluent limitations which provide essentially comprehensive coverage of industrial point sources, Natural Resources Defense Council v. Train, 510 F.2d 692, 710-11, 7 ERC 1209, 1221 (D.C. Cir. 1974). Section 306 does not mandate equally comprehensive coverage for new source effluent limitations regulations. Section 306(b)

lem of non-uniform national effluent limitations and the possibility of states attempting to attract industry by establishing less stringent requirements. Thus, during Senate debate on the Conference Report, Senator Muskie stated:

> "[T]he conference agreement provides that each polluter within a category or class of industrial sources will be required to achieve nationally uniform effluent limitations based on 'best practicable' technology [the Section 301(b)(1) standard] no later than July 1, 1977."[35]

2. The Statutory Framework For Effluent Reduction

With this background in mind, we can turn to detailed analysis of the Act. The ultimate objective of the

(1)(A), 33 U.S.C. § 1316(b)(1)(A). Therefore, new point sources for a number of industries will probably never be subject to new source standards of performance and should be subject to Section 301 effluent limitations.

Third, industry could properly assume that a state that establishes (through individual permit proceedings) weak effluent limitations for existing sources is also more likely to avoid applying to new sources effluent limitations which are more stringent than the national standard and to grant such sources variances, if available, and is less likely to apply strictly to new sources applicable new source effluent limitations and to develop and implement a stringent enforcement program.

[35] *Leg. Hist.* 162. And in an analysis of the Act submitted to the Senate during final debate on the Conference Report, Senator Muskie stated:

> "Except as provided in section 301(c) of the Act, the intent is that effluent limitations applicable to individual point sources within a given category or class be as uniform as possible. The Administrator is expected to be precise in his guidelines so as to assure that similar point sources with similar characteristics, regardless of their location or the nature of the water into which the discharge is made, will meet similar effluent limitations."

Leg. Hist. 172. *See Leg. Hist.* 156, 170, 263, 304, 711. *See also* discussion at pages 9-11 *supra*, and 17, 56-61 *infra*.

Act is forcefully and explicitly stated: "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[36] A principal goal of the Act is "that the discharge of pollutants into the navigable waters be eliminated by 1985."[37] In order to reach this goal, Congress directed in Section 301 that all discharges are unlawful unless allowed by a permit issued pursuant to Section 402.[38] These permits require compliance with the Act's requirements which, relevant to this case, are the effluent limitations for existing point sources established under Section 301.[39] In Section 301 Congress required that "effluent limitations established pursuant to this section . . . shall be applied to all point sources"[40] so that, by July 1, 1977, the discharge of effluents from industrial polluters will be limited to the level attainable by applying the "best practicable control technology currently available as defined by the Administrator pursuant to Section 304(b)(1)(A) of the Act."[41] By July 1, 1983, a higher standard is to be met and the industrial effluent limitations require the application of the "best available technology economically achievable" as determined pursuant to Section 304(b)(2)(A).[42] In essentially identical language for both the 1977 and 1983 standards, Section 304(b) directs the Administrator to publish regulations which shall identify "for classes and categories of

[36] Section 101(a), 33 U.S.C. § 1251(a).

[37] Section 101(a)(1), 33 U.S.C. § 1251(a)(1).

[38] NRDC v. Quarles, 396 F. Supp. 1393 (D.D.C. 1975), *appeal pending*, (D.C. Cir.); *see also* note 7 *supra*.

[39] Effluent limitations for new sources are established pursuant to Section 306. 33 U.S.C. § 1316. *See* discussion in notes 34 and 9 *supra*.

[40] Section 301(e), 33 U.S.C. § 1311(e).

[41] Section 301(b)(1)(A), 33 U.S.C. § 1311(b)(1)(A).

[42] Section 301(b)(2)(A), 33 U.S.C. § 1311(b)(2)(A).

point sources" the degree of effluent reduction attainable by application of the appropriate control technology.[43]

This effluent limitation portion of the Act's water pollution control scheme is premised on regulating discharges at their sources by means of technological controls which can be applied to limit and eventually to eliminate the discharges. Since both polluting discharges and control technology vary widely from industry to industry and also within broad industrial categories,[44] Congress developed a method for accounting for these differences so that nationally uniform effluent limitations could be developed and applied. Congress required Section 301 effluent limitations to be based on specific, carefully defined classes and categories of point source dischargers as identified pursuant to Section 304(b).

For the 1977 standard EPA is required to determine the best practicable control technology currently available for each class and category of point sources.[45] In making this determination, EPA must take into account factors such as costs in relation to effluent reduction benefits, the age of the equipment and facilities involved, the industrial processes and the engineering aspects, the non-water quality environmental impacts, and such other factors as the Administrator deems appropriate.[46] A similar

[43] Section 304(b)(1)(A), (b)(2)(A), 33 U.S.C. §§ 1314(b)(1)(A), (b)(2)(A).

[44] Thus, the pollutants discharged by a dairy product processing firm differ markedly from those of an inorganic chemicals manufacturing firm, and the pollutants discharged by a firm within the hydrogen peroxide production subcategory differ from those of a firm within the chlorine and sodium or potassium hydroxide production subcategory of the inorganic chemicals manufacturing category. *See* 39 Fed. Reg. 9611 (1974), App. 46b-47b, 32b-33b.

[45] Section 304(b)(1)(A), 33 U.S.C. § 1314(b)(1)(A).

[46] Section 304(b)(1)(B), 33 U.S.C. § 1314(b)(1)(B).

and parallel determination and analysis is to be undertaken in developing the standards for 1983.[47]

"Uniformity" was a basic rationale for establishing Section 301 effluent limitations for specific classes and categories of point sources, as was emphasized by Senator Muskie, principal author of the Act, in discussing the changes to Section 304 which were made in Conference:

> "The modification of subsection 304(b)(1) is intended to clarify what is meant by the term 'practicable.' The balancing test between total cost and effluent reduction benefits is intended to limit the application of technology only where the additional degree of effluent reduction is wholly out of proportion to the costs of achieving such marginal level of reduction for any class or category of sources.
>
> "The Conferees agreed upon this limited cost-benefit analysis in order to maintain uniformity within a class and category of point sources subject to effluent limitations, and to avoid imposing on the Administrator any requirement to consider the location of sources within a category or to ascertain water quality impact of effluent controls, or to determine the economic impact of controls on any individual plant in a single community." [48]

The point is restated and emphasized in the Conference Report:

> "The conferees intend that the Administrator or the State, as the case may be, will make the determination of the economic impact of an effluent limitation on the basis of classes and categories of point sources, as distinguished from a plant by plant determination." [49]

[47] Section 304(b)(2), 33 U.S.C. § 1314(b)(2).

[48] *Leg. Hist.* 170; *see also* pages 9-11, 12-14, and 57-61 for other quotations and citations to the legislative history.

[49] S. Rep. No. 92-1236 (Conf. Rep.), 92d Cong., 1st Sess. 121 (1972), *Leg. Hist.* 304; *See also* note 48 *supra*.

It is this analysis of water pollution control technology by classes and categories of industrial point source dischargers that is required by Section 304(b) pursuant to which the Section 301 point source effluent limitations are defined. These Section 301 effluent limitations are the key requirements and the benchmark for the operation and enforcement of the effluent abatement program established by the Act. Senator Muskie, summarized this close relationship between Sections 301 and 304(b) in discussing the Conference Report:

> "It is the intention that pursuant to subsection 301(b)(1)(A) and Section 304(b), the Administrator will interpret the term 'best practicable' when applied to various categories of industries as a basis for specifying clear and precise effluent limitations to be implemented by July 1, 1977." [50]

The effluent limitations established pursuant to Section 301 are then applied to individual dischargers by means of the permit system established by Section 402 of the Act and designated the National Pollutant Discharge Elimination System ("NPDES").[51] Under NPDES, the Administrator, or a state official pursuant to a federally approved state permit program,[52] may issue

[50] *Leg. Hist.* 169.

[51] The Section 402 permit program is another change of major importance from prior water pollution control legislation. It represents an extension and expansion of the permit program which had been developed by the Administration under the authority of the Refuse Act of 1899. 33 U.S.C. § 407. *See* H.R. Rep. No. 92-911, note 23 *supra*, at 125, *Leg. Hist.* 812. The point source effluent limitation standard-setting scheme and the permit program form one of the essential new pollution abatement methods established by the Act.

[52] Assumption of authority by the states for issuing permits does not affect in any way the uniform, national character of the water pollution abatement scheme established by the Act. The State permit program must comply with requirements of Section 402, it must insure that all applicable requirements established by the

a permit for the discharge of a pollutant on the condition that the discharge will meet all applicable requirements of the Act including the technological control standards for existing sources under Section 301 or for new sources under Section 306.[53]

Finally, the Act establishes two enforcement schemes for ensuring compliance with Section 301 effluent limitations. Enforcement by the federal Administrator is provided by Section 309 which requires the Administrator to take action if he finds any person to be in violation of either Section 301 or a permit condition or limitation established under Section 402.[54] Citizen enforcement is provided by Section 505 which allows citizens to bring suit against any person "who is alleged to be in violation of . . . an effluent standard or limitation under this Act . . . ." [55] Section 505 explicitly defines "effluent standard or limitation" to include "an effluent limitation or other limitation under Section 301 or 302 of this Act." [56] All of the enforcement provisions explicitly require compliance with effluent limitations established by Section 301 independent from compliance with Section 402 permit requirements.

Act, including Section 301 effluent limitations, are complied with, and it must be terminated if at any time after approval it fails to meet these requirements, among others. Section 402(b)-(f), 33 U.S.C. § 1342(b)-(f).

[53] Section 402, 33 U.S.C. § 1342. Other applicable requirements which permittees must meet are: Section 302 (water quality limitations); Section 307(a) (toxic discharge standards); Section 308 (inspection and monitoring requirements); and Section 403 (ocean discharge criteria) *see* 33 U.S.C. §§ 1312, 1317(a), 1318, 1343.

[54] Section 309, 33 U.S.C. § 1319.

[55] 33 U.S.C. § 1365(a)(1).

[56] 33 U.S.C. § 1365(f)(2).

3. The Permit System

Full understanding of the legislative scheme for abating industrial pollution requires careful analysis of the permit issuing process since it is at the core of the regulatory system and provides the basic method for applying national effluent limitations to individual dischargers. At the outset, it is important to emphasize two factors: (1) implementing the Section 301 effluent limitation scheme in individual permit proceedings is not a simple mechanical process of applying the appropriate Section 301 effluent limitation to a particular discharger;[57] (2) permits must require compliance with a large number of requirements other than Section 301 such as Sections 302, 306, 307, 308, and 403.[58] What follows is a brief discussion of a number of the responsibilities and functions that the permit issuing authority—state or federal—performs under the Section 402 permit program.

First, for many point sources no Section 301 effluent limitations will exist at the time when the permit authority must determine what effluent limitations shall be applied to a particular point source. This situation occurs, for example, when a state authority decides to issue a permit prior to promulgation of applicable Section 301 effluent limitations regulations or when no applicable Section 301 effluent limitations regulations will be promulgated.[59] On the other hand, for a complex point source which discharges effluent from several different manufacturing processes, several Section 301 effluent limitations regulations will be applicable and effluent limitations for the point source must be derived from a weighted application of the regulations.

Second, application of Section 301 effluent limitations to a non-complex point source also requires the permit authority to make a number of factual determinations and to exercise professional judgment and expertise. The permitting authority must first determine which point source subcategory the applicant is in.[60] The authority must therefore determine the production process or processes used by the applicant, since, for example, different inorganic chemical production processes may be used to produce the same product and each process produces different quantities of pollutants for which the Section 301 effluent limitations differ.[61] Then, since effluent limita-

[57] Petitioners allege that EPA's promulgation of national, uniform, minimum Section 301 effluent limitations would reduce "[s]tate authorities . . . to . . . mere scriveners whose only task is to 'mechanically crank' EPA-promulgated national standards ('limitations') into permits." *Pet. Brief* 58. The discussion at pages 20-25 above demonstrates that petitioners' allegation is groundless. In fact, the national, uniform, minimum Section 301 effluent limitations assist state authorities in carrying out their FWPCA responsibilities.

[58] Section 402(b)(1)(A), (b)(2), 33 U.S.C. §§ 1342(b)(1)(A), (b)(2).

[59] *See, e.g.*, Natural Resources Defense Council v. Train, 510 F.2d 692, 710-11 (1974) where the Court noted that EPA might determine in a few limited instances that it was appropriate not to promulgate effluent limitations regulations for certain point source categories. The District Court in Natural Resources Defense Council v. Train, Civ. Dkt. No. 1609-73 (D.D.C.), has, at EPA's request, vacated its order with respect to ten point source categories. *See* Order, dtd. Mar. 19, 1975.

[60] The inorganic chemicals category is subcategorized into 22 separate product subcategories. 40 C.F.R. Part 415, 39 Fed. Reg. 9611 (1974), App. B.

[61] For example, EPA states in the final regulations:

> "In cases where two dissimilar processes are used to manufacture the same product, separate limitations have been established within the subcategory." 39 Fed. Reg. 9611 (1974), App. 5b.

See, e.g., the chlorine and sodium or potassium hydroxide production subcategory where different effluent limitations are established for the mercury cell process and for the diaphragm cell process. *Id.*, at App. 32b-33b.

tions are almost always expressed in measures of weight of pollutant per unit of production (which allows different amounts of discharge for different sized plants), the applicant's quantity of production must be determined.[62]

Another example of the kinds of determinations that the permitting authority must make in applying Section 301 effluent limitations to particular point sources is provided by the effluent limitations for the petroleum refining point source category. Here the effluent limitations are expressed in measures of weight of pollutant per unit of feedstock. These base effluent limitations for each subcategory are then adjusted based upon the size of the facility (the amount of feedstock throughput) and the configuration of the facility (the different refining processes used to produce a product) that is seeking a permit.[63] These adjustment factors are set out in the petroleum refining point source category regulations. Application of these factors provides for establishing different effluent limitations for different plants.

The permit issuing authority has a number of other duties to perform. For example, the information necessary for establishing effluent limitations is sometimes claimed by a prospective permittee to be a trade secret. This information must then be obtained by the permitting agency under legal authority with appropriate guarantees of confidentiality.[64]

The permitting authority must also establish a schedule of compliance which "means a schedule of remedial measures including an enforceable sequence of actions or operations leading to compliance with an effluent limita-

[62] *Id.*

[63] *See, e.g.*, 40 C.F.R. §§ 419.12(a), (b), 419.22(a), (b), 40 Fed. Reg. 21939, 21949, 21950-51 (1975).

[64] *See* Section 308(b), 33 U.S.C. § 1318(b).

tion, other limitation, prohibition, or standard."[65] The importance of developing this schedule was underscored by Senator Muskie during final Senate debate on the Conference Report when he stressed that the July 1, 1977 compliance date established by Section 301 is the maximum time allowed; the Administrator is expected to achieve the Section 301 effluent limitation standards sooner if possible.[66] Determining the proper compliance

[65] Section 502(17), 33 U.S.C. § 1362(17):

> "The term 'schedule of compliance' means a schedule of remedial measures including an enforceable sequence of actions or operations *leading to compliance with an effluent limitation*, other limitation, prohibition, or standard." Section 502(17), 33 U.S.C. § 1362(17) (emphasis added).

> "The term 'effluent limitation' means any restriction established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance." Section 502(11), 33 U.S.C. § 1362(11).

It is relevant to note that the use of the terms "effluent limitation, other limitation, prohibition, or standard" in Section 502(17) as independent factors is consistent with the identical use of these terms in Sections 509(b)(1) and 505(f) to designate specific, independent bases for judicial review, which bases are separate from and in addition to grounds based on violations of a permit condition (Section 505(f)(6)) or based on the Administrator's action in issuing or denying a permit under Section 402 (Section 509(b)(1)(F)). This consistent use of these statutory terms in these provisions underscores that EPA's and Amicus NRDC's interpretation of the Act is correct—*i.e.*, that Congress intended EPA to establish Section 301 effluent limitations by regulation which effluent limitations are independent from Section 402 permit requirements. *See*, in particular, pp. 35-46 *infra*.

[66] *See* quotation in text on page 10 *supra*, and the following:

"Phase II in the Senate bill was to have been implemented by January 1, 1981. The conferees agreed on a 6-year period rather than a 5-year period to move to this significant phase. But again because of the time in conference, the slippage in the Senate bill is no more than 18 months. What does that slippage mean? It does not mean that polluters will be discharged from their responsibility

schedule requires thorough knowledge of the applicant's industrial process and effluent and current information about the availability of relevant control technology. Other decisions required of the permitting authority include establishing appropriate monitoring and reporting requirements.[67]

Thus, issuing a permit for an industrial point source discharge is not a simple, mechanical matter which can be performed by a mere "scrivener."[68] And the determinations set out here are only some of those required by Section 402.[69]

In sum, national, uniform, minimum Section 301 effluent limitations for the inorganic chemicals industry, which provide for establishing limitations based on a number of factors including the different manufacturing processes utilized and the quantity of products produced, are essential to effective operation of the Section 402 permit system and to meeting the goals of the Act. Without these effluent limitations it would be extremely difficult for the permitting authority in any reasonable time to make the many determinations it is required to make in establishing permit conditions and to prescribe limitations "which shall require the application of the best practicable control technology currently available . . . ." Section 301(b)(1)(A), 33 U.S.C. § 1311(b)(1)(A).

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to comply with the law. It only means that the requirements set forth in this act will be achieved in some cases at a date which is somewhat later than originally intended by the Senate. The Administrator retains the authority to require the application of these controls at an earlier date, and it is intended that he will require their application at the soonest practicable time." *Leg. Hist.* 162-163.

[67] *See* Section 308, 33 U.S.C. § 1318.

[68] *See* note 57 *supra*.

[69] *See* Section 402, 33 U.S.C. § 1342.

The Act is founded on a logical pattern. Section 301 of the Act sets out the basic requirements for establishing effluent limitations which are defined or determined by the Administrator pursuant to Section 304(b). Section 304(b) specifies factors to be taken into account in establishing the limitations and provides for the development of data on which the Section 301 effluent limitations for carefully defined subcategories of industrial point sources are to rest. When the Section 301 effluent limitations are defined pursuant to Section 304(b) and applied pursuant to Section 301(e), the limitations provide a uniform national system of technological control which is reduced to concrete expression in a permit issued under Section 402. The Section 402 permits are enforced under Sections 309 and 505 by reference to the permit itself, to Section 301 effluent limitations, and to other restrictions imposed by the Act.

C.

THE RULEMAKING PROCESS[70]

The regulations challenged by petitioners in this case, were adopted pursuant to Sections 301, 304(b) & (c),

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[70] In their brief, petitioners suggest that Congress intended EPA to promulgate, possibly with slight changes, as Section 304(b) regulations under the FWPCA the "guidance" documents that EPA had developed during 1971 and 1972 under the Refuse Act Permit Program, which was based on Section 13 of the Rivers and Harbors Act of 1899, 33 U.S.C. § 407, and had been established by Executive Order 11574, 35 Fed. Reg. 19627 (Dec. 25, 1970). *See Pet. Brief* 26, 14-15, 36, 42, 44-49.

This suggestion is without merit. Section 13 of the Rivers and Harbors Act of 1899 does not mandate consideration and application of the specific, statutory effluent limitation factors set out in Section 304(b). Thus, by enacting Sections 301 and 304(b), Congress did not intend that EPA should simply "conver[t] . . . the Refuse Act Permit Program guidance documents into published guideline regulations" as petitioners contend. *Pet. Brief* 26. The rulemaking process developed and implemented by EPA after en-

306(b) & (c), and 307(c), and consist of effluent limitations and guidelines, standards of performance, and pretreatment standards. These regulations were developed pursuant to a single, detailed, lengthy rulemaking process which involved substantial participation by petitioners as well as other interested members of the public.

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actment of the FWPCA in 1972 was designed specifically to meet the requirements of Sections 301 and 304(b).

In addition, Amicus American Petroleum Institute states that EPA's decision to promulgate the Section 301 effluent limitations in issue was made "on the basis of short-run expediency in the face of litigation by environmental groups designed to repeal 'meaningful local and state participation' and to resurrect the 'Federal dictatorship approach' rejected by Congress." Brief for Amicus Curiae American Petroleum Institute 13 (the only litigation cited and discussed by the Institute is Natural Resources Defense Council v. Train, 6 ERC 1033 (D.D.C. 1973), *aff'd in part and rev'd in part*, 510 F.2d 692 (D.C. Cir. 1974)). In *NRDC* v. *Train*, the Circuit Court held that the "District Court acted reasonably in using a publication schedule as a means of implementing its order" which was properly issued "to compel performance of a statutory duty that has been unreasonably delayed." *Id.* at 704. The Circuit Court noted that: "Requiring the courts to rely on mere exhortation . . . would undercut their ability to spur reticent defendants to render the performance to which the plaintiff and public are entitled. The authority to set enforceable deadlines both of an ultimate and an intermediate nature is an appropriate procedure for exercise of the court's equity powers to vindicate the public interest." *Id.*, at 705 (footnote omitted).

The American Petroleum Institute's statement regarding the purpose of NRDC's suit is patently false. And the assertion that NRDC's suit was a principal reason for a decision which Amicus American Petroleum Institute alleges EPA made "to discard Congress' flexible technology guidelines and to opt instead for rigid, single-number discharge standards . . ." is also erroneous. *Id.* 13-14. The discussion above of EPA's lengthy, detailed rulemaking process is more than adequate evidence to rebut Amicus American Petroleum Institute's assertion. Moreover, on August 8, 1973, prior to the time that NRDC filed its complaint and more than 3 months prior to the District Court's decision, EPA staff wrote a legal memorandum which discussed EPA's rulemaking approach for establishing uniform Section 301 effluent limitations. EPA, A COLLECTION OF LEGAL OPINIONS, 346-49 (Dec. 1970-Dec. 1973) (Vol. 1).

It is important to emphasize that on August 6, 1973, before EPA had published a single proposed effluent limitations guidelines regulation, it published an "Advance Notice of Public Review Procedures" which set out the specific steps of EPA's process for developing the regulations in issue.[71] The purpose of the notice was to facilitate public comments on the regulations.[72] The rulemaking process described in detail in the Advance Notice and followed with respect to the challenged regulations is summarized below.

First, EPA established the broad industrial categories for which it would develop effluent limitations, a list which was revised as EPA acquired more detailed knowledge of industrial processes, discharges, and control technology.[73] Currently, EPA expects to publish regulations for approximately 40 industrial categories.[74] EPA further analyzed each broad industrial category to determine whether separate limitations and standards were necessary for different segments within the category based on differences in raw materials, products, processes, age and size of equipment and facilities, waste water constituents, and other factors.[75] The regulations for the

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[71] 38 Fed. Reg. 21202 (1973), App. 21-42.

[72] *Id.*

[73] The analysis which follows is based on knowledge acquired by NRDC's Project On Clean Water and by other NRDC staff members as well as on EPA public documents and other literature, such as newsletters. Much of this information was presented to the United States District Court for the District of Columbia in the case of Natural Resources Defense Council v. Train, 6 ERC 1033 (D.D.C. 1973), *aff'd in part and rev'd in part*, 510 F.2d 692 (D.C. Cir. 1974).

[74] *See* Natural Resources Defense Council v. Train, 6 ERC 1033 (D.D.C. 1973), as amended by subsequent orders; the orders in the case list these categories.

[75] *See* 38 Fed. Reg. 21202, 21203 (1973), App. 24.

inorganic chemicals category challenged here establish 22 subcategories within that industry.[76]

Second, EPA conducted, generally by contract with independent consultants in cooperation with EPA personnel, extensive and detailed technical and economic analyses of selected categories and subcategories of point sources.[77] These contracts generally required submission to EPA of draft reports, which contained draft guidelines, in six months and final reports in eight months.[78]

Third, EPA solicited comments on the draft contractors' reports from the affected industries as well as from other interested persons, such as the states and environmental organizations.[79] Generally, as in this case, the affected industries submitted extensive comments.[80]

Fourth, based on the materials, data, and comments noted above, EPA issued proposed regulations and, at the same time or shortly thereafter, published a draft development document and an independent economic analysis analyzing a broad range of control technologies and pro-

[76] 39 Fed. Reg. 9611 (1974), App. B.

[77] *See generally* discussion in *Pet. Brief* 15-19, and in the preambles to the proposed and final regulations challenged herein, 38 Fed. Reg. 28174 (1973) App. 61, 39 Fed. Reg. 9611 (1974), App. B.

[78] *Id.*

[79] *See* 38 Fed. Reg. 28174 (1973), App. 82-83 (lists, *inter alia*, organizations from whom comments were solicited); EPA "Advance Notice of Public Review Procedures," 38 Fed. Reg. 21202-06 (1973) App. 21-42 ("[This] notice is divided into three parts. First, the basic legal authority for regulations concerning effluent limitations guidelines and standards of performance will be set forth. Second, EPA's general methodology will be described. Third, the means by which EPA has to date, and will in the future, seek the widest possible public scrutiny of the technical and legal basis for the regulations to be established will be explained." App. 22).

[80] *See* 38 Fed. Reg. 28174 (1973), App. 82-83.

viding the technical and economic basis for the proposed regulations.[81]

Fifth, EPA solicited additional public comments on the proposed regulations, often extending the public comment period in order to meet the requests of interested persons.[82]

Finally, more than a year after initiating the process of developing regulations, EPA promulgated final regulations followed by publication of a final development document and economic aanlysis.[83]

It is important to emphasize that the development documents and contractors' reports are formidable documents, generally consisting of several hundred pages,[84] and are an integral part of the rulemaking process. These documents contain detailed data and expert analysis which underlie and support the effluent limitations. Criticism of these documents during the rulemaking process results in reassessment, revision, and often additional research and analysis so that the final development documents provide adequate support for the regulations.[85]

[81] *See, e.g.*, 38 Fed. Reg. 28174 (1973), App. 82; the Draft Development Document and Draft Economic Analysis are printed in the record, *see* App. 1, 43, 48.

[82] *See, e.g.*, 38 Fed. Reg. 28174 (1973), App. 82.

[83] *See, e.g.*, 39 Fed. Reg. 9611 (1974), App. B. In addition, in some cases in response to comments on final regulations EPA proposed amendments, sought additional comments, and, if warranted, amended the regulations. This process occurred, for example, with respect to the petroleum refining point source category regulations. *See* 39 Fed. Reg. 37069 (1974), 40 Fed. Reg. 21939 (1975).

[84] *See, e.g.*, App. 107, R. 1-451 (more than 450 pages); App. 48-59, R. 4455 (more than 350 pages).

[85] *See, e.g.*, preamble to final regulations, 39 Fed. Reg. 9611 (1974), App. B. *Affidavit of Lillian D. Regelson*, Deputy Administrator, EPA, Aug. 12, 1974, submitted in Natural Resources Defense Council v. Train, Civ. Dkt. No. 1609-73 (D.D.C.).

The lengthy and detailed rulemaking process described above produced the regulations in issue in this case. The process involved the active participation of the petitioners.[86] In response to hundreds of pages of extensive comments and criticisms submitted by petitioners, EPA provided detailed reasons for the final rulemaking actions it took and, in several instances, changed its proposed regulations in direct response to petitioners' comments.[87] The final regulations in issue in this case establish Section 301 effluent limitations, Section 304 effluent limitation guidelines, Section 306 standards of performance, and Section 307 pretreatment standards for the inorganic chemicals category.

SUMMARY OF ARGUMENT

The Federal Water Pollution Control Act Amendments of 1972 ("Act"), 33 U.S.C. §§ 1251 *et seq.*, fundamentally revised the federal regulatory system for abating water pollution. Under prior law, discharges of pollutants were regulated by controls based on water quality standards. This method required proof that a particular discharge would adversely affect the water quality of the receiving waters and cause water quality to exceed applicable standards. In addition, the federal government had a secondary role in establishing water quality standards and enforcing their violation. Congress found this pre-1972 method for abating water pollution to be ineffective.

In the 1972 Act, Congress established a radically different water pollution control program. The program is based on the premise that any discharge of pollutants to the navigable waters of the United States is unlawful unless permitted pursuant to the Act. Discharges from

[86] *See Pet. Brief* 15-19; 38 Fed. Reg. 28174 (1973), App. 60; 39 Fed. Reg. 9611 (1974), App. B.

[87] *See* 39 Fed. Reg. 9611 (1974), App. 46-186.

each point source are required at a minimum to comply with national, uniform effluent limitations which are based on available technology and established by the federal Environmental Protection Agency. As a result, discharges of pollutants will be abated on a uniform national basis without requiring proof that the pollutant discharge adversely affects water quality.

Sections 301(b) and 304(b) of the Act require these technology-based effluent limitations to be developed for carefully defined classes and categories of point sources. In order to apply these effluent limitations to each point source discharger, Congress established a permit program under Section 402 of the Act, made it unlawful for any point source to discharge any pollutant without a permit, and required that these effluent limitations be included as minimum conditions in each permit. Pursuant to Sections 301 and 304(b) of the Act, the Administrator of the Environmental Protection Agency has issued regulations promulgating national, uniform technology-based effluent limitations for numerous carefully defined categories of point sources.

The principal issue in this case is the proper interpretation of the requirements of Sections 301, 304(b) and 402 of the Act. These sections establish the effluent limitation control program outlined above. Petitioners challenge the Administrator's authority to promulgate by regulation Section 301 effluent limitations. EPA, Amicus NRDC, and six of the seven U.S. Courts of Appeals that have rendered decisions on this issue believe that the Administrator is authorized by the Act to take such rulemaking action.

Section 301(b) requires each point source to achieve by July 1, 1977, effluent limitations "which shall require the application of the best practicable control technology currently available as defined by the Administra-

tor pursuant to Section 304(b) . . . ." Section 301(e) requires that "[e]ffluent limitations established pursuant to this section . . . shall be applied to all point sources of discharge . . . ." Section 501(a) provides that "[t]he Administrator is authorized to prescribe such regulations as are necessary to carry out his functions under this act." Other sections of the Act speak of "effluent limitations established under Section 301" or of "effluent limitations under Section 301." (Sections 316(c), 401(a)(1), 401(d), 505(f), 509(b)(1)(E)). Thus, the Administrator is authorized to promulgate by regulation Section 301 effluent limitations. The legislative history of the Act fully supports this conclusion. In addition, a number of statutory requirements could not be effectively implemented if the Administrator were not authorized to establish Section 301 effluent limitations by regulation (*e.g.*, Sections 303(d)(1)(A), 401(a)).

The Act also requires that the Section 301 effluent limitations be national, uniform limitations. Sections 301(b) and 304(b) specifically require the effluent limitations to be established on the basis of "classes and categories" of point sources. Section 301(c) confirms that national, uniform Section 301 effluent limitations must be established. This Section permits the Administrator to grant an individual point source a variance from the 1983 Section 301 effluent limitations if the point source meets the Section 301(c) criteria.

The legislative history fully supports the conclusion that the Section 301 effluent limitations must be national in scope and uniform. For example, during Senate debate of the final bill, Senator Muskie, floor leader for the bill and a principal architect of the Act, stated that

> "[T]he Conference agreement provides that each polluter within a category or class of industrial sources will be required to achieve nationally uniform effluent limitations based on 'best practicable' technology no later than July 1, 1977." *Leg. Hist.* 162.

The objective of achieving nationally uniform effluent limitations was repeatedly emphasized in the legislative history. Thus, the Administrator is authorized and required by the Act to promulgate by regulation national, uniform Section 301 effluent limitations.

The U.S. Courts of Appeals have exclusive jurisdiction to review the regulations in issue. Section 509 requires review by a U.S. Court of Appeals of "the Administrator's action . . . in . . . promulgating any effluent limitation . . . under section 301 . . . ."

ARGUMENT

I. THE ENVIRONMENTAL PROTECTION AGENCY IS AUTHORIZED TO ESTABLISH SECTION 301 EFFLUENT LIMITATIONS BY REGULATION

Section 301 states that "[e]ffluent limitations established pursuant to this section . . . shall be applied to all point sources"[88] so that "there shall be achieved . . . not later than July 1, 1977, effluent limitations . . . which shall require the application of the best practicable control technology currently available as defined by the Administrator pursuant to Section 304(b) of this Act . . . ."[89] Section 501(a) provides that "[t]he Administrator is authorized to prescribe such regulations as are necessary to carry out his functions under this Act."[90] Thus, contrary to

[88] Section 301(e), 33 U.S.C. § 1311(e).

[89] Section 301(b)(1)(A). 33 U.S.C. § 1311(b)(1)(A).

[90] 33 U.S.C. § 1361(a).

petitioners' contention, the Administrator is authorized to establish Section 301 effluent limitations by regulation.[91]

In this case, petitioners contend that effluent limitation guidelines regulations for existing sources can not legally be promulgated under Section 301 and that Section 301 effluent limitations can be established only in the process of issuing permits to individual dischargers pursuant to Section 402. *Pet. Brief* 30-84.

This attack on EPA's authority to issue Section 301 effluent limitations serves as the platform from which petitioners attempt to dismantle the interpretation of the Act upon which EPA has developed its clean water regulatory program in order to meet Congress' mandate that discharges of pollutants be substantially reduced. Petitioners' interpretation of the Act is strained and forced when compared to the straight-forward reading of the Act urged by EPA and Amicus NRDC. Petitioners' interpretation is fatally defective in failing to account for the plain wording of the Act, its structure, and its legislative history. Based on these factors, Amicus NRDC demonstrates in the following discussion that Congress intended that EPA should establish Section 301 effluent limitations by regulation. Accordingly, petitioners' proposed reading of the Act should be rejected and the Section 301 effluent limitations guidelines in issue should be held to have been promulgated as a proper exercise of the Administrator's authority.[92]

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[91] Six of the seven U.S. Courts of Appeals that have rendered decisions on this issue have upheld the Administrator's authority to issue Section 301 effluent limitations by regulation. *See* cases listed in notes 1 & 2 *supra*.

[92] As noted in notes 1 & 2 *supra*, six of seven U.S. Courts of Appeals have agreed with this conclusion. The reasons which they present in support of their decisions are similar, although different circuits have emphasized different factors.

For judicial support, petitioners rely solely on the opinions of the U.S. Court of Appeals for the Eighth Circuit in CPC International Inc. v. Train, 515 F.2d 1032 (8th Cir. 1975) and the U.S. District Court in Grain Processing Corp. v. Train, 407 F.Supp. 96 (S.D. Iowa 1976) (this case was brought after the *CPC* case *supra*). The errors in the Eighth Circuit's reasoning have been addressed explicitly by several of the other circuit courts.

A. The Act Mandates The Establishment Of Section 301 Effluent Limitations

Both by the Act's explicit language and by establishing an integrated statutory structure which is consistent only with that explicit language, Congress made clear that Section 301 effluent limitations must be established pursuant to Section 301 itself and independent of Section 402.

1. *The Language of the Act*

Throughout the title of the Act covering "Standards and Enforcement," the Act speaks simply and explicitly of effluent limitations "established under Section 301."[93] Thus, and most importantly, Section 301(e) states:

> "*Effluent limitations established pursuant to this section* or section 302 of this Act shall be applied to all point sources of discharge of pollutants in accordance with the provisions of this Act."[94]

Simply stated, Section 301(e) contemplates establishment of Section 301 effluent limitations according to the requirements of Section 301.[95] Moreover, Section 301(e) makes clear that the effluent limitations "established" under Section 301 "shall be applied to all point sources" by means such as permits issued under Section 402.

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[93] *See* citation of relevant statutory provisions in text which follows.

[94] 33 U.S.C. § 1311(e) (emphasis added).

[95] *See* American Meat Institute v. EPA, 526 F.2d 442, 450 (7th Cir. 1975); American Frozen Food Institute v. Train, —— F.2d ——, ——, 8 ERC 1993, 2005-06 (D.C. Cir. 1976).

Other statutory provisions use language similar to Section 301(e) or of similar import and underscore petitioners' error: "Any standard established pursuant to Section 301" in Section 316(b); "effluent limitations established under Section 301" in Section 316(c); "effluent limitations under Section 301" in Sections 401(a)(1), 401(d), 505(f), and 509(b)(1)(E); and "effluent limitations required by [or "under"] Section 301" in Sections 302(a), 303(d)(1)(A), and 303(e)(3)(A).[96]

The language of these provisions makes clear that the Act intends that effluent limitations are to be established under Section 301 and independent of Section 402, thereby wholly refuting petitioners' interpretation. This is the course which the EPA Administrator has followed in the challenged regulations and it is the proper legal course.

2. *The Statutory Structure*

Analysis of the statutory structure for developing, applying, reviewing, and enforcing effluent limitations underscores the conclusion reached above: Section 301 effluent limitations are to be established under Section 301 itself. A detailed analysis of the statutory structure which demonstrates that this conclusion is correct is set out at pages 14-19 *supra*. Only the more salient aspects will be emphasized below.

First, there is the explicitly stated relationship between Sections 301 and 304. Section 301 requires that "effluent limitations *established pursuant to* [*this*] *section* . . . shall be applied to all point sources" which limitations "shall require application of the best practicable control technology currently available *as defined* by the Adminis-

[96] *See* American Iron & Steel Institute v. EPA, 526 F.2d 1027, 1039 (3d Cir. 1975); American Meat Institute v. Train, 526 F.2d 442, 450 (7th Cir. 1975).

trator *pursuant to Section 304(b)* of the Act . . . ."[97] The close relationship of Sections 304(b) and 301 has been set out above.[98] Here it is relevant to emphasize simply that the information and analysis developed pursuant to Section 304 serves as the basis for defining the effluent limitations which are established under Section 301.[99]

Second, these Section 301 effluent limitations play a crucial role in establishing and applying water quality related effluent limitations and in the certification process that the states conduct with respect to federal proceedings which allow discharges to occur under other statutory authority.

Absurd results are reached under the water quality provisions of Section 303(d)(1)(A) if effluent limitations may not be established under Section 301. That section requires each state to identify "those waters within its boundaries for which the effluent limitations required by Section 301(b)(1)(A) and Section 301(b)(1)(B) are not stringent enough to implement any water

[97] 33 U.S.C. §§ 1311(e), (b)(1)(A), (b)(1)(B) (emphasis added).

[98] *See* pages 14-18 *supra; see also* American Iron & Steel Institute v. EPA, 526 F.2d 1027, 1039 (3d Cir. 1975).

[99] Petitioners suggest that "guidelines" under Section 304 would be significantly more flexible than the regulations under Section 301. *Pet. Brief* 26-29 & *passim*. There is no basis in the statute or the legislative history for assuming that Section 304(b) guidelines would allow major variation from plant to plant instead of being specific. *See* quotes at p. 14 & n.35. The term "guideline" is also used in Section 304(h), 33 U.S.C. § 1314(h), which section mandates EPA to establish specific minimum requirements for state programs. Obviously minimums are to be minimums and such specific requirements can be established by "guidelines" or by "regulations" under the Act. Thus, petitioners' interpertation of and emphasis on the word "guideline" is no more than a make weight argument in petitioners' analysis of Sections 301 and 304.

quality standard applicable to such waters." [100] Water quality standards are often defined in precise quantitative terms: "x" parts per thousand of total dissolved solids or a temperature level of "y" degrees Fahrenheit.[101] It is impossible to relate the general Section 301 statutory standard of "best practicable control technology currently available" to a precise, numerical state water quality standard until the Section 301 statutory standard is itself given particular definition as a numerical effluent limitation with respect to the point source discharges being considered. Therefore, Section 303(d)(1)(A) makes sense only if establishment of particularized Section 301 effluent limitations was intended.

In addition if Section 301 effluent limitations could be established only by being incorporated in a Section 402 permit, then the water quality standards planning process required by Section 303 could not be effectively implemented. In brief, the Section 303 process requires, *inter alia*, the following: (a) designation of water quality limited segments based on a determination that Section 301 effluent limitations are not stringent enough to achieve water quality standards for that segment; this requires a comparison of the limitations with the standards; (b) a determination of total maximum daily load for discharges of pollutants from point sources into the water quality limited segment.[102] Then this total maximum daily load is allocated among the point sources which discharge into the segment and the resulting effluent limitation, which is necessarily more stringent than the Section 301 effluent limitation, is incorporated in the discharger's permit issued pursuant to Section

[100] 33 U.S.C. § 1313(d)(1)(A).

[101] *E.g.*, New York State standards for class "AA" waters require that for the concentration of total dissolved solids "in no case shall it exceed 500 milligrams per liter." 6 N.Y.C.R.R. § 701.4.

[102] Sections 303(d), (e), 33 U.S.C. §§ 1313(d), (e).

402.[103] Thus, establishment of Section 301 effluent limitations must precede issuance of Section 402 permits if the Section 303 water quality waste load allocation process is to be effectively implemented.

It is important to emphasize that the water quality provisions of Sections 302 and 303 mention Section 301 but not Section 402, thereby demonstrating that Section 301 effluent limitations are to be established independently of Section 402.

Section 401(a)(1) requires each applicant for a federal license permitting a discharge to obtain a state certification that its proposed discharge will comply with Sections 301 and 306 of the Act and further requires:

> "In the case of any such activity for which there is not an applicable effluent limitation or other limitation under sections 301(b) and 302, and there is not an applicable standard under sections 306 and 307, the State shall so certify . . . ." [104]

[103] Sections 402(b)(1)(A), 301(b)(1)(C), 33 U.S.C. §§ 1342(b)(1)(A), 1311(b)(1)(C).

[104] 33 U.S.C. § 1341.

Moreover, and of particular importance, in Section 401 Congress specifically treated Section 301 "effluent limitations" as of equal importance and as of similar independent significance as the Sections 306 and 307 "standards." Similarly, in Section 316(b), Congress specifically referred to the Section 301 effluent limitations as "standards." 33 U.S.C. § 1316(b) ("Any standard established pursuant to section 301 or section 306 . . . ."). And, in the Conference Report, Congress states: "Section 302 would permit the setting of more stringent standards than those required by section 301 . . . ." S. Rep. No. 92-1236 (Conf. Rpt.) note 49 *supra*, at 122, *Leg. Hist.* 305; *see also id.*, at 320 ("Any standard established pursuant to section 301 or 306 . . . .").

Thus, contrary to Amicus American Petroleum Institute's repeated assertions, the different statutory terms—"standards" and "effluent limitations"—are of no relevance in determining if Congress intended EPA to establish national Section 301 effluent limitations by regulation. Brief of Amicus Petroleum Institute 26-31. Amicus American Paper Institute advances similar arguments. Brief

of Amicus American Paper Institute 44-45. In fact, in light of Amicus American Petroleum Institute's statement "that Congress *consistently* used the term 'standards' when it intended EPA to promulgate fixed, *across-the-board restrictions by regulation,*" *Id.* 25 (emphasis of "consistently" added; other emphasis in original) the Section 316(b) reference to "standard established pursuant to section 301" would seem to be a conclusive determination that EPA and Amicus NRDC's interpretation of the Act is correct. Sections 316(b) and 401(a)(1) also rebut the Eighth Circuit's view that "the term 'standards' . . . takes on a special meaning because of its use under the Act." CPC International Inc. v. Train, 515 F.2d 1032, 1038 (8th Cir. 1975).

Amicus American Petroleum Institute attempts to explain away Section 301(b)'s reference to "[a]ny standard established pursuant to Section 301" by asserting that this reference is to Section 301(b)(1)(A)(ii) and that "[e]stablished pursuant to this provision of Section 301, of course, are the pretreatment *standards* of Section 307(b) & (c), thereby explaining the mention of '*standard*' in Section 316(b)." Brief of Amicus American Petroleum Institute 26 n.20 (emphasis in original) (It should be noted that Sections 301(b), 304(b), 316, and 402 apply to *direct* dischargers to navigable waters, including publicly owned treatment works, while Section 307(b) applies to *indirect* dischargers, *i.e.* discharges into publicly owned treatment works. *See* pp. 14-19 *supra.*) The Petroleum Institute's argument is without merit. First, if Amicus American Petroleum Institute's assertion were correct, then Section 316(b) would impose no requirements on existing point sources which discharge directly into the nation's navigable waters. Most steam electric power plants, which are the major sources of thermal effluent and which were the focus of Congress' concern in enacting Section 316, are direct dischargers; the Water Pollution Control Federation notes that "[t]he discharge of steam and boiler blow-off to sewers is prohibited in almost all sewer ordinances." WATER POLLUTION CONTROL FEDERATION, WPCF MANUAL OF PRACTICE NO. 3: REGULATION OF SEWER USE 18 (1975). And Mr. Clausen, in describing the requirements of Section 316 to the House, stated: "Section 316(b) requires the location, design, construction and capacity of cooling water intake structures of steam electric generating plants to reflect . . . ." *Leg. Hist.* 264.

Second, the legislative history regarding Section 316 makes clear that references to Section 301 in Section 316 included those provisions which establish effluent limitations for direct dischargers. *See* H.R. REP. NO. 92-911, note 23 *supra*, at 117, *Leg. Hist.* 807, S. REP. NO. 92-1236 (Conf. Rep.), note 49 *supra*, at 137, *Leg. Hist.* 320, *Leg. Hist.* 267-68, 273-74.

[Footnote continued on page 41]

This last provision is utter nonsense if no effluent limitations can be established under Section 301. First, without Section 301 limitations which are independent of and precedent to those fixed in a permit, certification of a permit application could not occur. Second, the Section 301 statutory standards were fixed the day the Act was passed, so the certification provision requires for its implementation that more particular Section 301 effluent limitations be established.[105]

Third, the Section 509(b)(1) judicial review provision makes clear that the Administrator is authorized to establish Section 301 effluent limitations by regulation. Section 509 provides for judicial review in the U.S. Courts of Appeals:

> "of the Administrator's action . . . (E) in approving or promulgating any effluent limitation or other limitation under section 301 . . . and (F) in issuing or denying any permit under section 402 . . . ." [106]

Not only does this section make explicit reference to the action of the Administrator in promulgating Section 301 effluent limitations, but it also makes separate reference to Section 301 effluent limitations and Section 402 permits, demonstrating their independence.[107] Section 505

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[104] [Continued]

In sum, there is absolutely no support for Amicus American Petroleum Institute's assertion that the Section 316(b) reference to "standard established pursuant to Section 301" is a reference only and simply to "pretreatment standards" through Section 301 (b)(1)(A)(ii).

[105] *See* American Iron & Steel Institute v. EPA, 526 F.2d 1027, 1038-39 (3d Cir. 1975); American Meat Institute v. EPA, 526 F.2d 442, 451 (7th Cir. 1975).

[106] Section 509(b)(1), 33 U.S.C. § 1369(b)(1).

[107] The Third Circuit considered Section 509(b)(1) as providing "[p]erhaps the strongest indication in the Act that the Administrator has the power under Section 301 to promulgate effluent limi-

(f), which provides for citizen suits, contains similar language, reinforcing this conclusion.[108]

Finally, enforcement of the Act's requirements is provided by two provisions: enforcement by the federal Administrator is governed by Section 309 [109] and enforcement by citizens' suits is governed by Section 505.[110] Both provisions assume that Section 301 effluent limitations will be established under Section 301 and independent of Section 402.

Under Section 309, the EPA Administrator is required to take remedial action whenever he

> "finds that any person is *in violation of section 301*, 302, 306, 307, or 308 of this Act, *or* is *in violation of any permit condition or limitation* implementing any of such sections in a permit issued under section 402 of this Act by him or by a State, ..." [111]

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tations . . . ." American Iron & Steel Institute v. EPA, 526 F.2d 1029, 1037 (3d Cir. 1975); *See also* American Frozen Food Institute v. Train, —— F.2d ——, ——, 8 ERC 1993, 2006, (D.C. Cir. 1976). The Third Circuit went on to provide a comprehensive and detailed rebuttal of the Eighth Circuit's attempt to discount the importance of Section 509(b)(1). Of particular significance is that the Eighth Circuit found no merit in EPA's analysis of Section 509(b)(1) (which analysis is similar to that in the text *supra*) on the ground that the reference to Section 301 in Section 509(b)(1) "is necessary if the Administrator's action under § 301(c) . . . is to be subject to judicial review." CPC International, Inc. v. Train, 515 F.2d 1032, 1043 (8th Cir. 1975); *see Pet. Brief* 82n.72. However, as the Third Circuit noted, Section 509 contained the reference to Section 301 in both the Senate and House bills and Section 301(c) as adopted was only added to the Act in the Conference Report. American Iron & Steel Institute v. EPA, 526 F.2d 1027, 1037 & n.16 (3d Cir. 1975).

[108] Section 505(f), 33 U.S.C. § 1365(f).

[109] 33 U.S.C. § 1319.

[110] 33 U.S.C. § 1365.

[111] 33 U.S.C. § 1319(a)(3) (emphasis added).

Thus, this section contemplates that Section 301 effluent limitations will be developed which are independent of and enforceable apart from a permit issued under Section 402.[112] These Section 301 effluent limitations must be specific and precise since violation of Section 301 subjects a discharger to civil penalties of a substantial nature:

> "Any person who *violates section 301*, 302, 306, 307 or 308 of this Act, *or any permit condition or limitation* implementing any of such sections in a permit issued under section 402 of this Act . . . shall be subject to a civil penalty not to exceed $10,000 per day of such violation." [113]

There is also the possibility of criminal penalties under Section 309(c)(1) where there has been willful or negligent violation of Section 301.[114]

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[112] Despite the specific language of Section 309 and the other statutory language set out *supra*, petitioners contend that Section 301 is wholly dependent upon Section 402 and can be implemented only in each Section 402 permit. *E.g., Pet. Brief* 26-30 & *passim*. Congress, however, contemplated that a person could be in violation of Sections 301(a) and 301(b) independent of Section 402. *See* statutory language *supra*. The Senate Report states, with respect to Section 505, that "[i]n addition to violations of Section 301(a), citizens . . . [may] bring enforcement action for violations of effluent limitations under Section 301 . . . and any condition of any permit issued under section 402." S. REP. No. 92-414, note 28 *supra*, at 82, *Leg Hist.* 1500.

Moreover, the fact that the statutory language and the legislative history recognize that Section 301 effluent limitations are enforceable independently of the permit system eliminates another factor relied on by the Eighth Circuit in holding that the Administrator is not authorized to establish Section 301 effluent limitations by regulation. *See* CPC International Inc. v. Train, 515 F.2d 1032, 1038 (8th Cir. 1975).

[113] 33 U.S.C. § 1319(d) (emphasis added).

[114] 33 U.S.C. § 1319(c)(1).

Section 505, which governs enforcement of the Act through citizens' suits, permits one to sue "any person . . . who is alleged to be in violation of . . . an effluent standard or limitation under this Act. . . ." [115] For the purposes of Section 505, "effluent standard or limitation" is defined in six separate subsections to be, *inter alia*, "(2) an effluent limitation or other limitation under section 301 . . . *or* . . . (6) a permit or condition thereof issued under Section 402 . . ." [116] If Section 301 effluent limitations could be established only by means of Section 402 permits, then subsections (2) and (6) would be redundant.[117]

In sum, the enforcement provisions of the Act make clear that Congress intended that Section 301 effluent limitations would be established under Section 301 itself and independent of any other provision of the Act, including Section 402.

Petitioners contend, however, that the Act does not authorize the Administrator to issue effluent limitations regulations under Section 301.[118] The Third Circuit concluded, and other circuits agree, that "the promulgation of regulations establishing [Section 301(b)] limitations is within his inherent rulemaking power." [119] This power is provided by Section 501:

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[115] 33 U.S.C. § 1365(a)(1).

[116] 33 U.S.C. § 1365(f) (emphasis added).

[117] *Accord* American Iron & Steel Institute v. EPA, 526 F.2d 1027, 1038 (3d Cir. 1975); American Meat Institute v. EPA, 526 F.2d 442, 451 (7th Cir. 1975).

[118] *Pet. Brief* 26-30.

[119] American Iron & Steel Institute v. EPA, 526 F.2d 1027, 1039 (3d Cir. 1975) (footnote omitted). *See also* E.I. duPont de Nemours & Co. v. Train, —— F.2d ——, ——, 8 ERC 1718, 1721 (4th Cir. 1976); Hooker Chemicals & Plastic Corp. v. Train, —— F.2d ——, ——, 8 ERC 1961, 1966 (2d Cir. 1976); American Frozen Food Institute v. Train, —— F.2d ——, ——, 8 ERC 1993, 2006 (D.C. Cir. 1976).

"The Administrator is authorized to prescribe such regulations as are necessary to carry out his functions under this Act." [120]

In support of their position, petitioners rely strongly on the contention that Congress intended the States to have an important role in administering the Section 402 permit program and that this goal would be defeated by EPA's establishment of Section 301 effluent limitations by regulation.[121] The basic tenet of petitioners' argument is that if EPA can establish national, uniform Section 301 effluent limitations by regulation, then state permit authorities will have no real responsibilities under their Section 402 NPDES permit program such as a responsibility to "make factual findings based upon particular circumstances at individual plants." [122] Petitioners characterize their argument by stating:

> "State authorities were not to be mere *scriveners whose only task is to* 'mechanically crank' EPA-promulgated national standards ('limitations') into permits." [123]

But petitioners' brief contains no factual analysis of what state permit authorities do in conducting a permit proceeding and issuing permits. The facts completely rebut petitioners' assertions. As discussed in detail at pages 20-24 *supra*, state permit authorities have numerous responsibilities and tasks to perform under the Section 402 permit program, only one of which is applying Section 301 effluent limitations to individual point sources, and this action itself requires the exercise of professional judgment and expertise. Moreover, as provided

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[120] 33 U.S.C. § 1361(a).

[121] *Pet. Brief* 35-36, 42, 49-60.

[122] *Pet. Brief* 27.

[123] *Id.* 58 (emphasis added).

by Section 510, states may require any point source to meet effluent limitations more stringent than those established by EPA.[124]

In sum, EPA's issuance of national, uniform, minimum Section 301 effluent limitations does not divest state permit authorities of responsibilty and reduce them to "mere scriveners."

B. The Legislative History Demonstrates That The Act Mandates The Establishment Of Section 301 Effluent Limitations

The legislative history of the Act makes clear that Congress intended that Section 301 effluent limitations would be established pursuant to Section 301 and independent of Section 402 permits. This conclusion is demonstrated by explicit references to "effluent limitations established under Section 301" as well as by discussion of "section 301 standards" and of Section 301 as being the "environmental control" section. All of these references are consistent only with the interpretation that enforceable effluent limitations are to be established under Section 301 itself and not just in Section 402 permits.

It is important to emphasize at the outset that the legislative history demonstrates that Congress fully intended EPA to issue regulations pursuant to Sections 301 *and* 304(b) of the Act, just as EPA has done in this case, demonstrating that EPA's rulemaking proceeding is wholly consistent with the Act's requirements under Section 301. Thus, Senator Bentsen, a key member of the Senate Public Works Committee, stated during debate on the Senate bill:

> "In phase I, for point sources of pollutants, effluent limits shall be established not later than January 1, 1976, [now July 1, 1977], which comply with specifically defined levels of effluent control and treatment. As defined in section 301(b)(1) of the bill, *and as elaborated in the regulations which we anticipate the Administrator shall issue pursuant to section 301 and section 304*, these 1976 [now 1977] goals shall be at least . . . the 'best practicable control technology currently available' for [industrial] point sources . . . ." [125]

[124] Section 510, 33 U.S.C. § 1370.

And Representative Clausen, a member of the Conference Committee, stated during House debate on the conference report:

> "The Administrator should consider the results of [the] studies [required by Section 104(t)] in *promulgating regulations* not only under Section 316 but also *under other sections of the act* where thermal discharge may be regulated, *including Section 301* on effluent limitations, Section 303 on water quality standards and Section 306 on new source performance standards." [126]

With respect to EPA's authority to establish effluent limitations pursuant to Section 301, the House Report, in discussing the Administrator's authority under Section 302 to change or modify Section 301 effluent limitations, states:

> "Proposed effluent limitations under section 302 shall in no case operate to delay the application of

[125] *Leg. Hist.* 1283 (emphasis added). *See* American Iron & Steel Institute v. EPA, 526 F.2d 1027, 1040 (3d Cir. 1975); American Meat Institute v. EPA, 526 F.2d 442, 451 (7th Cir. 1975); Hooker Chemicals & Plastics Corp. v. Train, —— F.2d ——, ——, 8 ERC 1961, 1965-66 (2d Cir. 1976).

[126] *Leg. Hist.* 264. *See* Hooker Chemicals & Plastics Corp. v. Train, —— F.2d ——, ——, 8 ERC 1961, 1966 (2d Cir. 1976); American Frozen Food Institute v. Train, —— F.2d ——, ——, 8 ERC 1993, 2001 (D.C. Cir. 1976).

any effluent limitation established under section 301." [127]

Similarly, the Conference Report states:

"Section 302 requires more stringent standards than those required by section 301 if such effluent limits would interfere with attaining the 1981 interim goal." [128]

The Report then states that the House Amendment to Section 302,

"would permit the setting of more stringent *standards* than those required by section 301, essentially using the same tests as the Senate bill." [129]

Similarly, the legislative history regarding the state certification provision of the Act, Section 401, shows that Congress intended Section 301 to have independent status and effect. During Senate debate on the original Senate bill, Senator Muskie explained the scope of Section 401 and said:

"This section . . . requires that any applicant for a Federal license or permit provide the licensing agency with a certification from the State in which the discharge occurs that any such discharge will comply with section [sic] 301 and 302, *which are the environmental control sections.*" [130]

Likewise, the House Report states:

"This [Section 401] certification must state that any such *discharge will comply with* the 'applicable' provisions of *sections 301*, 302, 306, 307 and 316 of this Act." [131]

[127] H.R. REP. No. 92-911, note 23 *supra*, at 104, *Leg. Hist.* 791 (emphasis added).

[128] S. REP. No. 92-1236 (Conf. Rep.), note 49 *supra*, at 121, *Leg. Hist.* 304 (emphasis added). *See* cases listed in note 125 *supra*.

[129] *Id.*, at 305 (emphasis added). *See* note 104 *supra* for detailed discussion of references in the Act to Section 301 standards.

[130] *Leg. Hist.* 1388 (emphasis added).

No reference is made to Section 402.

Finally, the legislative history of the two major enforcement provisions of the Act, Sections 309 and 505, repeatedly underscores the independent status of Section 301 requirements, violation of which is subject to both civil and criminal liability. Thus, the Senate Report states:

"When EPA finds anyone violating Sections 301, 302, 306, 307, 308, or 402, the agency must either issue an order that requires immediate compliance or bring a civil suit . . . .

"Anyone willfully or negligently violating a Section 402 permit or any of several other specific sections of the bill shall be liable to a fine of up to $25,000 per day of violation and one year in jail. For a willful negligent *violation of Sections 301*, 302, 306, 307, *or 402*, the fine shall be not less than $2,500 per day." [132]

Similarly, the House Report states:

"In the case of a willful or negligent *violation* by any person *of section 301*, 302, 306, 307, 308, or 316, *or any permit condition or limitation . . . .*" [133]

Regarding the citizen suit enforcement provision, Section 505, the Senate Report states:

"Authority granted to citizens to bring enforcement actions under this section is limited to effluent stand-

[131] H.R. REP. No. 92-911, note 23, *supra*, at 121, *Leg. Hist.* 808 (emphasis added).

[132] S. REP. No. 92-414, note 28, *supra*, at 63, *Leg. Hist.* 1481 (emphasis added).

[133] H.R. REP. No. 92-911, note 23, *supra*, at 115, *Leg. Hist.* 802 (emphasis added).

ards or limitations established administratively under the Act . . . .

"In addition to violations of section 301(a), citizens are granted authority to bring enforcement actions for violations of schedules or timetables of compliance and *effluent limitations under section 301, . . . and any condition of any permit issued under section 402.*" [134]

In sum, the legislative history fully supports the conclusion that Section 301 effluent limitations are to be established and enforced independent of any other section of the Act, including Section 402. Accordingly, contrary to petitioners' contention, EPA is authorized to establish Section 301 effluent limitations by regulation and acted in compliance with the Act's requirements in promulgating regulations establishing the Section 301 effluent limitations which have been challenged in this case.

II. THE ACT MANDATES ESTABLISHMENT OF NATIONAL, UNIFORM SECTION 301 EFFLUENT LIMITATIONS FOR CONTROLLING DISCHARGES OF POLLUTANTS WITHIN CATEGORIES OF INDUSTRY

In the regulations challenged in this case, EPA established national, uniform effluent limitations [135] for specific, carefully defined classes and categories of industrial

[134] S. REP. No. 92-414, note 28 *supra*, at 81-82, *Leg. Hist.* 1499-1500 (emphasis added) (*see* note 112 *supra* for additional discussion of this reference).

[135] This phrase refers to the Section 301 "effluent limitations," the Section 306 "standards of performance," and the Section 304(b) "effluent limitations guidelines" which have been promulgated by the regulations in issue. *See* note 9 *supra*.

point sources as required by Sections 301 and 304(b) of the Act.[136]

Petitioners contend that Section 301 effluent limitations can be established only on a point source by point source basis. Petitioners argue that each of the thousands of industrial point sources must be analyzed individually

[136] EPA has promulgated a "variance clause" which is part of each Section 301 effluent limitation regulation. *See, e.g.*, 39 Fed. Reg. 9611 (1974), App. 32b. The variance clause provides that if factors regarding a discharger "are fundamentally different from the factors considered in the establishment of the guidelines . . . [then the] effluent limitations in the NPDES permit [may be] either more or less stringent than the limitations established [in the regulation], to the extent dictated by such fundamentally different factors." *Id.*

Amicus NRDC believes that EPA is required by the Act to publish national, uniform Section 301 effluent limitations and that the variance clause is not sanctioned by the Act. NRDC contested EPA's promulgation of the variance clause; the U.S. Court of Appeals for the Second Circuit upheld EPA's action. Natural Resources Defense Council v. EPA, —— F.2d ——, 8 ERC 1988 (2d Cir. 1976). (Other circuits have upheld the variance clause: E. I. duPont de Nemours v. Train, —— F.2d ——, ——, 8 ERC 1718, 1722 (4th Cir. 1976); American Frozen Food Institute v. Train, —— F.2d ——, ——, 8 ERC 1993, 2016-18 (D.C. Cir. 1976).)

In *NRDC* v. *EPA*, *supra*, the Circuit Court did not address one of NRDC's principal arguments: that Congress explicitly provided means for meeting hardships encountered in complying with Section 301 effluent limitations. Section 8 or the Federal Water Pollution Control Act Amendments of 1972 amended Section 7 of the Small Business Act, 15 U.S.C. § 636, to provide loans "to assist any small business concern . . . to meet water pollution control requirements established under the [FWPCA] . . . ." *See Leg. Hist.* 1355, where Sen. Nelson, author of the amendment, stated: "The alternative to such incentives as extending pollution control loans would be waiving strict environmental standards where economic hardship could be shown. But the approach of giving variances to pollution controls based on economic grounds has long ago shown itself to be a risky course: All too often, the variances become a tool used by powerful political interests to obtain so many exemptions for pollution control standards and timetables on the flimsiest of pretenses that they become meaningless. In short, with variances, exceptions to pollution cleanup can become the rules, meaning further tragic delay in stopping the destruction of our environment."

under the entire array of factors set out in Section 304 (b) of the Act. Petitioners oppose the establishment of Section 301 effluent limitations by classes and categories of point sources.

In sum, petitioners' position is inconsistent with the requirements of the Act and, if adopted, would result in impractical and chaotic administration of the Act, since each of the approximately 40,000 industrial point source permit proceedings would become a *de novo* standard setting proceeding.[137] Such a result would severely tax EPA's and the states' resources and seriously impair their ability to meet their obligations under the Act.[138] Congress foresaw and avoided this course in mandating the establishment of national, uniform Section 301 effluent limitations by classes and categories of point sources. Thus EPA's interpretation of the Act's requirements is correct and must prevail over that of petitioners.[139]

It is important to emphasize that the discussion in Section I of this Brief, pages 33-50 *supra*, has demonstrated that the Act requires EPA to establish Section 301 effluent limitations pursuant to Section 301 itself and independent of Section 402. The analysis presented below confirms and underscores the conclusion which follows from the analysis and discussion of Section I.

The conclusion that the Act requires establishment of national, uniform effluent limitations under Section 301 for specific classes and categories of point source dischargers follows from two factors: the explicit requirements of Sections 301 and 304 regarding the application

[137] *See* note 18 *supra*.

[138] *Accord*, E.I. duPont de Nemours & Co. v. Train, —— F.2d ——, 8 ERC 1718, 1722 (4th Cir. 1976).

[139] Regarding the "uniformity" issue, of the five circuit courts that have considered the issue, four have essentially upheld EPA's position. *See* pp. 2-3 *supra* and note 172 *infra*.

of the "classes and categories" concept; and the legislative history which elaborates upon the meaning of these statutory requirements and which confirms Amicus NRDC's interpretation of the Act. The basic reason Congress developed the "classes and categories" concept was to enable EPA to prescribe national, uniform effluent limitations which were deemed essential for effectively abating pollution of the Nation's waters.

A. The Requirements Of Sections 301 And 304

Section 301 prescribes two effluent limitation requirements for existing point sources—one to be achieved by July 1, 1977, the other by July 1, 1983.[140] These requirements are to be "defined" or "determined" by regulations developed pursuant to Section 304(b).[141] The sections are identical in structure and use essentially identical language. This unity emphasizes the common objectives of these sections, particularly that of utilizing specific classes and categories of point sources as the basis for prescribing Section 301 effluent limitations.

Thus, Section 304(b)(1)(A), pursuant to which the Section 301(b)(1)(A) "best practicable" standard is to be "defined," requires publication of effluent limitations guidelines which shall:

> ". . . . identify, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, the degree of effluent reduction attainable through the application of the best practicable control technology currently available *for classes and categories of point sources . . . .*" [142]

[140] Section 301(b)(1)(A), (b)(2)(A); 33 U.S.C. §§ 1311(b)(1)(A), (b)(2)(A).

[141] Section 304(b)(1)(A), (b)(2)(A); 33 U.S.C. §§ 1314(b)(1)(A), (b)(2)(A).

[142] 33 U.S.C. § 1314(b)(1)(A) (emphasis added).

Similarly, Section 304(b)(2)(A), pursuant to which the Section 301(b)(2)(A) "best available" standard is to be "determined," [143] also requires publication of effluent limitations guidelines "for classes and categories of point sources." [144] Then, Sections 304(b)(1)(B) and (b)(2)(B), which relate to the "best practicable" and "best available" standards, require the regulations to

> "[s]pecify factors to be taken into account in determining . . . measures and practices to be applicable to point sources . . . *within such categories or classes.*" [145]

These provisions make clear that Congress intended that effluent limitations be developed for specific classes and categories of point sources.[146]

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[143] This is the term used in Section 301(b)(2)(A), 33 U.S.C. § 1311(b)(2)(A), as compared with "defined" in Section 301(b)(1)(A), 33 U.S.C. § 1311(b)(1)(A). No difference in substance or operation of the two subsections is reflected by this different terminology nor is any suggested by the legislative history.

[144] 33 U.S.C. § 1314(b)(2)(A).

[145] Section 304(b)(1)(B), 33 U.S.C. § 1314(b)(1)(B) (emphasis added). Section 304(b)(2)(B) is virtually identical:

> "specify factors to be taken into account in determining the best measures and practices . . . to be applicable to any point source . . . with such categories or classes."

In only one instance do Sections 301 and 304(b) differ in referring to "classes and categories of point sources" as the basis for establishing effluent limitations. This occurs in Section 301(b)(2)(A). The detailed discussion of the reasons why the phrase was included in Section 301(b)(2)(A) as a result of House amendments to the Senate bill and adoption of a Conference substitute is presented at pages 56-58 *infra*; this difference and the process which produced it reinforces the conclusion evidenced by the provisions quoted above that Congress intended that uniform effluent limitations be developed for specific classes and categories of point sources.

[146] *See* E.I. duPont de Nemours & Co. v. Train, —— F.2d ——, ——; 8 ERC 1718, 1722-23 (4th Cir. 1976); Hooker Chemicals & Plastic Corp. v. Train, —— F.2d ——, ——, 8 ERC 1961, 1968 (2d Cir. 1976); American Frozen Food Institute v. Train, —— F.2d ——, ——, 8 ERC 1993, 2008-09 (D.C. Cir. 1976).

Section 306, which applies to new sources and which also requires establishment of effluent limitations [147] for classes and categories of point sources, indicates more clearly what Congress expected EPA to do in determining appropriate "classes and categories." [148] In Section 306(b)(1)(A) Congress listed 27 industrial categories for which "at a minimum" EPA was required to develop effluent limitations.[149] Congress recognized that significant differences existed among both plants and effluent discharges included in these broad industrial categories. Therefore, Congress provided that:

> "The Administrator may distinguish among classes, types, and sizes within categories of new sources for the purpose of establishing such standards and shall consider the type of process employed (including whether batch or continuous)." [150]

Factors which EPA considers in determining appropriate classes and categories of point sources for the regulations in issue include those specified in Section 304(b) [151] and are set out in the "Advance Notice of Public Review Procedures" published by EPA to inform interested persons about the specific steps involved in developing effluent limitations regulations.[152]

Thus, the dispute between petitioners on the one hand and EPA and Amicus NRDC on the other is not whether there are variations among industrial discharges—there

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[147] Under Section 306, "effluent limitations" are called "standards of performance," 33 U.S.C. § 1316(a)(1). *See* note 9 *supra* and Section 502(11), 33 U.S.C. § 1362(11) (quoted in note 65 *supra*).

[148] 33 U.S.C. § 1316.

[149] 33 U.S.C. § 1316(b)(1)(A).

[150] 33 U.S.C. § 1316(b)(2).

[151] 33 U.S.C. § 1314(b).

[152] *See* ¶ 2, 38 Fed. Reg. 21202 (1973), App. 24-25.

clearly are. The basic question is how Congress instructed EPA to deal with these variations in developing effluent limitations. EPA and Amicus NRDC contend that the Act authorizes EPA to identify specific classes and categories of point sources for which Section 301 effluent limitations are to be developed so that these limitations can be applied uniformly to the point sources within each category. Petitioners argue that the Act requires publication of general guidelines which will then be adjusted and revised for each point source discharge based on the individual characteristics of the applicant's discharge, or essentially that the Act requires *de novo* development in each permit proceeding of the Section 301 effluent limitations.

B. The Legislative History Of Sections 301 And 304

Two aspects of the legislative history demonstrate that Amicus NRDC's interpretation of the Act is correct. The first consists of relevant portions of the detailed report on the meaning and operation of Sections 301 and 304 which Senator Muskie, principal author of the Act, submitted to the Senate during final debate on the Conference Report. The second consists of a detailed discussion of the legislative history pertinent to Section 301(c) of the Act, a provision which was developed in Conference in order to resolve differences regarding the 1983 effluent limitations requirements.

The clearest, most detailed discussion in the legislative history about the meaning and operation of Sections 301 and 304 is contained in Senator Muskie's detailed report.[153] As revelant to the issues involved in this case,

[153] Senator Muskie was a principal author of the FWPCA Amendments of 1972 and a major force in achieving their enactment. Regarding the comprehensive, detailed report which he prepared on each of the significant provisions of the bill, *Leg. Hist.* 166-184, most courts have accorded it weight in determining the intended

Senator Muskie affirmed three points, which are basic to Amicus NRDC's position. First, the Conferees agreed that Section 301 effluent limitations would be established for specific classes and categories of point sources as defined by Section 304(b).[154] Second, the Conferees intended that the various factors which must be considered in determining "best practicable" and "best available" control technology must be taken into account at the time effluent limitations are established and not when they are applied to particular dischargers.[155] Third, the Conferees intended that Section 301 effluent limitations would be uniform and that the only variance from such uniformity permitted by the Act is that allowed by Section 301(c),

meaning and operation of the Act. *See, e.g.*, American Iron & Steel v. EPA, 526 F.2d 1027, 1037 n. 15, 1040-41 (3d Cir. 1975); American Meat Institute v. EPA, 526 F.2d 442, 451-52 (7th Cir. 1975); Hooker Chemicals & Plastics Corp. v. Train, —— F.2d ——, ——, 8 ERC 1961, 1966 (2d Cir. 1976); American Frozen Food Institute v. Train, —— F.2d ——, ——, 8 ERC 1993, 1998-99 (D.C. Cir. 1976); Natural Resources Defense Council v. Train, 510 F.2d 692 (D.C. Cir. 1974); CPC International Inc. v. Train, 515 F.2d 1032, 1042 (8th Cir. 1975); *Contra* Grain Processing Corp. v. Train, 407 F. Supp. 96, 103 (S.D. Iowa 1976); *cf. Pet. Brief* 42 n.43, 60-63. It is relevant to note that Senator Jackson's criticism of Senator Muskie's report (which is quoted at *Pet. Brief* 61) was directed only at issues involving Section 511(c) which is concerned primarily with the applicability of the National Environmental Policy Act to the FWPCA. *See Leg. Hist.* 204. Moreover, petitioners also rely on Sen. Muskie's report in support of their arguments. *See Pet. Brief* 55-56, 67.

[154] *Leg. Hist.* 171. ("Section 304(b), as agreed to by the Conferees, requires that the Administrator publish regulations which shall provide guidelines for the establishment of the effluent limitations to be achieved by categories and classes of point sources (other than publicly owned treatment works) pursuant to section 301(b) of the Act.")

[155] *Leg. Hist.* 172. ("The Conferees intend that the factors described in section 304(b) be considered only within classes or categories of point sources and that such factors not be considered at the time of the application of an effluent limitation to an individual point source within such a category or class.")

which applies only to effluent limitations which implement the 1983 "best available" standard:

> "Except as provided for in section 301(c) of the Act, the intent is that effluent limitations applicable to individual point sources within a given category or class be as uniform as possible. The Administrator is expected to be precise in his guidelines so as to assure that similar point sources with similar characteristics, regardless of their location or the nature of the water into which the discharge is made, will meet similar effluent limitations." [156]

These conclusions are also stated in the Conference Report:

> "The conferees intend that the Administrator or the State, as the case may be, will make the determination of the economic impact of an effluent limitation on the basis of classes and categories of point sources, as distinguished from a plant by plant determination. However, after July 1, 1977, the owner or operator of a plant may seek relief from the requirement to achieve effluent limitations based on best available technology economically achievable." [157]

As stated at the beginning of this brief,[158] a basic objective of the Act is to develop national, uniform Section 301 effluent limitations. Congress was interested in avoiding competitive disadvantage from occuring among existing plants by preventing industries from inducing local authorities, based, for example, on reasons of economic development or local dependence on a dominant industry, to grant the industry permission to discharge pollutants to the Nation's waters at rates exceeding the

[156] *Id.* (italicization of section reference omitted).

[157] S. Rep. No. 92-1236 (Conf. Rep.), note 49 *supra*, at 121 (1972), *Leg. Hist.* 304. *See* American Frozen Food Institute v. Train, —— F.2d ——, ——, 8 ERC 1993, 1996 (D.C. Cir. 1976).

[158] *See* pages 5-19 *supra*.

national limitations.[159] This emphasis on uniformity appears repeatedly in the legislative history.[160]

National uniformity was the first consideration which Senator Muskie laid before the Sentate during its final debate on the bill.[161] The point was emphasized by Senator Muskie in the detailed analysis of the Act which he submitted to the Senate during final debate on the Conference Report. First, in discussing the resolution by the Conferees of the relationship of the cost-benefit analysis required by Section 304(b)(1) for the purpose of defining 1977 "best practicable control technology," Senator Muskie reported:[162]

[159] *See* the discussion of Sen. Nelson quoted in note 136 *supra* which indicates Congress' concern regarding variances from the pollution control standards established under the Act.

[160] *See Leg. Hist.* 132, 156, 162, 170, 172, 209, 263, 309, 451-53, 466-67, 473-75, 516-17, 577, 711, 727, 1219, and 1405. *And see* discussion and citations at pages 10-11, 13-14, 17-18 *supra*.

[161] *Leg. Hist.* 162:

> "Senators will recall from the November debate on the Senate bill that there were three essential elements to it: Uniformity, finality, and enforceability. Without these elements a new law would not constitute any improvement on the old; we would not bring a conference agreement to the floor without them.
>
> "As far as uniformity and finality are concerned, the conference agreement provides that each polluter within a category or class of industrial sources will be required to achieve nationally uniform effluent limitations based on 'best practicable' technology no later than July 1, 1977."

[162] This same point on the consideration of economic impact was made explicitly by Rep. Dingell in the House:

> "The conference report emphasizes on page 121 a very important point, the report states:
>
> > 'The conferees intend that the Administrator or the State, as the case may be, will make the determination of the economic impact of an effluent limitation on the basis of classes and categories of point sources, as distinguished from a plant by plant determination.'

[Footnote continued on page 60]

"The Conferees agreed upon this limited cost-benefit analysis in order to maintain uniformity within a class and category of point sources subject to effluent limitations, and to avoid imposing on the Administrator any requirement to consider the location of sources within a category or to ascertain water quality impact of effluent controls, or to determine the economic impact of controls on any individual plant in a single community." [103]

Second, as already shown, Senator Muskie made the same point regarding uniformity in discussing the possibility of obtaining variances under Section 301(c) from the 1983 "best available control technology" standard.[104]

Uniformity was also a primary goal sought by the Administrator of EPA. In commenting at length on the final bill, William Ruckelshaus, then Administrator of EPA, stated:

"Despite the national character of pollution, it has not been dealt with uniformly. Varying local revenue capabilities, economic pressures, and citizen interest have often stagnated community and State initiative. To assure equity and national progress the Federal Government undertook to coordinate and support the many various efforts to control water pollution.

". . . To overcome these existing disparities, the Administration proposed that 'standards be amended

[102] [Continued]

"Thus, a plant-by-plant determination of the economic impact of an effluent limitation is neither expected, nor desired, and, in fact, it should be avoided." *Leg. Hist.* 254-55.

[103] *Leg. Hist.* 170. *See* American Frozen Food Institute v. Train, —— F.2d ——, ——, 8 ERC 1993, 1997-2000 (D.C. Cir. 1976).

[104] *Leg. Hist.* 172. The quotation is set out above at page 58.

to impose precise effluent requirements on all industrial sources.' The enrolled bill has done so." [165]

In sum, the legislative history confirms the basic points of Amicus NRDC's position—particularly that Section 301 effluent limitations are to be uniform. The legislative history also underscores the conclusion that petitioners' position—that Section 301 effluent limitations are to be established by *ad hoc*, individual decisions by the permit authority in issuing each Section 402 permit—is wholly inconsistent with a basic purpose of the Act.

A brief discussion of the factors EPA considered in developing the Section 301 effluent limitations in issue demonstrate that the challenged regulations conform with the Act's requirements. EPA divided the inorganic chemicals category into twenty-two separate subcategories based on factors such as "raw material used, product produced, manufacturing process employed, age, size, waste water constituents, and other factors . . . ." [166] For each subcategory, waste water constituents and applicable control and treatment technologies were identified.[167] This identification included determining, for example, the effluent level produced by applying each technology, the "problems, limitations and reliability of each technology . . .", non-water quality environmental impacts of each technology, and the costs of applying each technology.[168] Then the Section 304(b)(1) "best practicable control technology currently available" was identified as a result

[165] *Leg. Hist.* 156 (Ltr. fr. William Ruckelshaus, Administrator, EPA, to Office of Management and Budget, Executive Office of the President, Oct. 11, 1972, recommending presidential approval of the FWPCA).

[166] 38 Fed. Reg. 28174 (1975), App. 65; *see* EPA's "Advance Notice of Public Review Procedures," 38 Fed. Reg. 21202 (1973), App. 24-25, for a general discussion of the factors considered.

[167] *Id.*, App. 66.

[168] *Id.*

of considering various factors including age of equipment and facilities, process employed, engineering aspects of applying various control techniques, process changes, non-water quality environmental impact (including energy requirements), costs and benefits of applying the technology, and other factors.[169] Finally, effluent limitations —which, for any point source, are either a range of values or a maximum allowable discharge—were established for approximately eleven pollutants.[170] As an example, set out below are effluent limitations for discharges which result from use of the electrolytic process within the hydrogen peroxide production subcategory of the inorganic chemicals category:

"

"Effluent characteristic	"Effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed—
	"Metric units (kilograms per 1,000 kg of product)	
"TSS	0.005	0.0025
Cyanide A	.0004	.0002
pH	Within the range 6.0 to 9.0.	
	"English units (pounds per 1,000 lb of product)	
"TSS	0.005	0.0025
Cyanide A	.0004	.0002
pH	Within the range 6.0 to 9.0.	

" [171]

Petitioners contend that EPA's effluent limitations guidelines regulations are invalid because, in part, they

[169] *Id.*

[170] 39 Fed. Reg. 9611 (1974), App. B.

[171] *Id.*, App. 47b.

fail to establish "ranges" of discharge levels. Petitioners state:

> "Congress *expressly* required EPA to issue guideline regulations in the form of ranges of effluent pollutant values . . . ." *Pet. Brief* 28 (emphasis added)

The term "range" does not appear in Sections 301 or 304(b). With respect to these sections, the only mention of the term "range" occurs in the legislative history. And all but one of the five circuit courts that have addressed the issue whether the effluent limitations guidelines regulations must establish "ranges" of effluent limitations have held that EPA is not required to establish such "ranges".[172]

As discussed in detail above, the regulations in issue clearly meet the statutory criteria. Moreover, the effluent limitations which result from applying the subcategorization process comprise a range of effluent limitations which four circuit courts have held to be fully consistent with the requirements and policies of the Act and its legislative history, including the statements from the

[172] The cases decided by these four circuits are: E.I. duPont de Nemours & Co. v. Train, —— F.2d ——, 8 ERC 1718, 1723 (4th Cir. 1976) (held that the effluent limitations are "presumptively applicable"); Hooker Chemicals & Plastics Corp. v. Train, —— F.2d ——, ——, 8 ERC 1961, 1968 (2d Cir. 1976); American Frozen Food Institute v. Train, —— F.2d ——, ——, 8 ERC 1993, 2015-16 (D.C. Cir. 1976); American Petroleum Institute v. EPA, —— F.2d ——, ——, 9 ERC ——, ——, —— (10th Cir. 1976) (Slip. Op. 22).

The Third Circuit is the only circuit court that has held that the effluent limitations guidelines regulations must establish "ranges" of effluent limitations. The Third Circuit based this holding on its interpretation of Section 304(b), relying primarily on S. Rep. No. 92-414, note 28 *supra*, at 50, *Leg. Hist.* 1468, American Iron & Steel Institute v. EPA, 526 F.2d 1027, 1045 (3d Cir. 1975).

[Footnote continued on page 64]

legislative history quoted by petitioners in their brief.[173] *Pet. Brief* 66-67, *e.g.*:

> "The Administrator should establish the range of "best practicable" levels based upon the average of the best existing performance by plants of various sizes, ages, and unit processes within each industrial category." [174]

Petitioners also argue that the regulations in issue establish national, uniform Section 301 effluent limitations and that the Administrator may not lawfully establish by regulation uniform limitations. *See, e.g., Pet. Brief* 27-29, 63-73. Petitioners' complaint is only with the process for achieving the "[u]niform national technological objectives for effluents [which] were specified in Section 301," since petitioners' acknowledge that Congress intended that such objectives were to be achieved. *Pet. Brief* 49.

Amicus NRDC has discussed in detail the statutory provisions, legislative history, and practical considerations which demonstrate that Congress intended that the Administrator should establish national, uniform, minimum Section 301 effluent limitations by regulation. Petitioners' and Amicus American Petroleum Institute's attempts to counter this analysis are based primarily on two arguments.

First, petitioners contend that in providing for states to issue Section 402 permits, Congress meant to create

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[172] [Continued]

The Seventh Circuit did not address the "range" issue in its opinion, presumably because the parties in the case did not contend "that the requirements of § 304(b) were not complied with." American Meat Institute v. EPA, 526 F.2d 42, 448 n.13 (7th Cir. 1975).

[173] Note 172 *supra*.

[174] S. Rep. No. 92-414, note 28 *supra*, at 50. *Leg. Hist.* 1468.

substantial state control over the determination of the basic Section 301 effluent limitations, which are the central and critical standards of the Act, by having state authorities themselves establish the Section 301 limitations in each individual permit.[175] This is exactly the opposite of what Congress meant to accomplish. The federal Administrator sets every basic effluent limitation and standard in the Act, other than Section 303 ambient water quality standards.[176] Congress granted the Administrator the authority and imposed on him the duty to allow the States to administer the Section 402 permit program, but only if each State established a permit program which would meet the federal requirements established pursuant to the Act.[177] Thus, Rep. Blatnik, Chairman of the House Committee on Public Works and a main sponsor of the bill, wrote in his summary report of the bill:

> "All permits issued under this program shall be consistent with the specific requirements of the bill, including effluent limitations . . . ." [178]

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[175] *See, e.g., Pet. Brief* 11-12, 26-29, 42-43, 51-58. It should be noted, however, that state authorities prescribe schedules of "compliance" for each individual permit, and "schedules of compliance" are an "effluent limitation" under the Act. Section 502(17), 33 U.S.C. § 1362(17). *See* discussion in note 65 *supra*. This aspect of the process for achieving the Section 301 effluent limitation deadlines is not in issue in this case.

[176] *I.e.*, Sections 301, 304(b), 306, 307(a), (b), (c), 33 U.S.C. §§ 1311, 1314(b), 1316, 1317(a), (b), (c).

[177] Sections 304(h)(2), 402(b)-(k), 33 U.S.C. §§ 1314(h)(2), 1342(b)-(k). *See Leg. Hist.* 727 ("[A] careful reading of the House bill shows that it assigns overriding authority to the Federal Government and direct administrative responsibilities to the States only when, and as, the individual States demonstrate their ability and reliability to live up to that responsibility." (Cong. Robinson)). A similar statement was made by Cong. Gubser. *Leg. Hist.* 664.

[178] *Leg. Hist.* 362.

Congress established a significant number of precise procedural and substantive federal requirements which state Section 402 per-

Amicus American Petroleum Institute contends that EPA's veto power over permits was a basic method adopted by Congress for achieving national, uniform, effluent limitations and quotes with approval the Eighth Circuit's conclusion that "the veto power would make no sense if EPA was already empowered to promulgate regulations under § 301." [179] *Amicus American Petroleum Institute Brief* 41.

It is important to emphasize that the Section 402 veto power was enacted to assist EPA in achieving a number of important statutory objectives in addition to providing EPA with a means of overseeing the application of Section 301 effluent limitations in individual permits. Thus, the veto power is an important tool for ensuring that Section 303 water quality standards are properly applied to dischargers in water quality limited segments, *see* Sections 303 and 301(b)(1)(C), 33 U.S.C. §§ 1313, 1311(b)(1)(C), and for ensuring that in issuing permits the states require full compliance by dischargers with the requirements of the Act such as Sections 302 (water quality effluent limitations), 306 (new source performance standards), 307 (toxic substance standards; pretreatment standards), 308 (monitoring requirements), and 403 (ocean discharge criteria), in addition to Section 301 (effluent limitations).

mit programs and state issued permits must meet. However, exercise of these responsibilities as well as other state permit program responsibilities requires substantial exercise of professional judgment and expertise by state authorities. *See* detailed discussion at pages 20-24 *supra*. States may establish effluent limitation requirements more stringent than the federal requirements, *see* Section 510, 33 U.S.C. § 1370, which would be applied to individual point sources by state permit authorities. In addition, states may establish requirements pursuant to their water quality planning processes, *see* Sections 303(e), 208, 33 U.S.C. §§ 1313(e), 1208. In appropriate cases, these state requirements may be implemented through the state permit program.

[179] CPC International Inc. v. Train, 515 F.2d 1032, 1040-41 (8th Cir. 1975).

Amicus American Petroleum Institute's argument—that the veto power would not be meaningful if national, uniform Section 301 effluent limitations were promulgated by regulation—must mean that the Petroleum Institute believes that such promulgation would deprive the permit granting authority of substantially all discretion. This belief is contrary to the facts as demonstrated by the detailed discussion of the extensive responsibilities and actions that state permit authorities must exercise and undertake. *See* pages 20-24, 45-46 *supra*. As a practical matter, the veto power cannot be the principal means for ensuring achievement of nationally uniform effluent limitations because the task would overwhelm EPA: the agency could not individually review and revise, as necessary, the approximately 40,000 industrial permits which are expected to be issued to industrial point sources (nor the approximately 20,000 municipal permits) for the purpose of establishing uniform effluent limitations for similar classes and categories of point sources as required by the Act.[180] Thus, promulgation of national, uniform, minimum Section 301 effluent limitations, not exercise of the veto power over each permit, was the key element of the Congressional scheme for achieving uniform effluent limitation treatment of similar point sources.

III. THE UNITED STATES COURT OF APPEALS HAS EXCLUSIVE JURISDICTION PURSUANT TO SECTION 509 TO REVIEW EPA'S EFFLUENT LIMITATIONS GUIDELINES REGULATIONS

Section 509(b)(1) of the Act provides:

> "Review of the Administrator's action (A) in promulgating any standard of performance under section 306, . . . (C) in promulgating any effluent standard, prohibition, or treatment standard under

[180] *See* note 23 and pp. 14-24 *supra*.

section 307, . . . (E) in approving or promulgating any effluent limitation or other limitation under section 301, 302, or 306 . . . may be had by any interested person in the Circuit Court of Appeals of the United States for the Federal judicial district in which such person resides or transacts such business upon application by such person." 33 U.S.C. § 1369 (b)(1).

The detailed discussion and analysis of the Act's structure and requirements and of EPA's rulemaking actions in issue presented in Sections I and II above (pp. 33-67) demonstrate that these actions are "action[s] . . . promulgating an[] effluent limitation or other limitation under Section 301 . . . ." Section 509(b)(1)(E), 33 U.S.C. § 1369(b)(1)(E). Accordingly, the U. S. Court of Appeals has exclusive jurisdiction under Section 509 of the Act to review the regulations.

Six of the seven U. S. Courts of Appeals that have considered this issue have held that the U. S. Court of Appeals has exclusive jurisdiction to review the regulations in issue.[181] Amicus American Iron and Steel Institute supports EPA's position and presents a detailed argument in support of its conclusion.[182] And Amicus American Petroleum Institute supports U. S. Court of Appeals jurisdiction under Section 509 by stating, *inter alia*, that "whatever else they are, EPA's 'effluent limitations guidelines' constitute an 'action of the Administrator' in 'approving or promulgating' effluent limitations implemented in individual plant permits." [183] Finally,

[181] *See* cases listed in note 1 *supra*. Only the Eighth Circuit in CPC International Inc. v. Train, 515 F.2d 1032 (8th Cir. 1975) has held that the U.S. Court of Appeals lacks jurisdiction.

[182] Brief for Amicus Curiae American Iron and Steel Institute 2-3, 5-13.

[183] Brief for Amicus Curiae American Petroleum Institute 18 & n.18. However, the Institute expresses concern that, *inter alia*, a "ruling by this Court that review jurisdiction lies *exclusively* in the courts of appeals might nullify several actions pending in the district courts . . . ." *Id.* (emphasis in original) To the extent that this is a problem, the Institute suggests alternative remedies. *Id.*

EPA provides in its brief a comprehensive and careful analysis of why the U. S. Court of Appeals has exclusive jurisdiction under Section 509 to review the regulations in issue and answers in detail petitioners' arguments to the contrary.

CONCLUSION

Petitioners' contentions are inconsistent with the requirements and objectives of the Act. If adopted, petitioners' interpretation would replace the Act's comprehensive, integrated, carefully coordinated water pollution control program based on applying and enforcing national, uniform Section 301 effluent limitations with a system of essentially *ad hoc*, uncoordinated individualized state effluent limitation setting procedures.

A careful, comprehensive reading of the Act and its legislative history and a detailed consideration of the process required for developing, applying, and enforcing Section 301 effluent limitations make clear that Amicus' and EPA's interpretation of the Act is correct. This interpretation represents a reasonable exercise of the Administrator's authority and is, as well, the interpretation mandated by the Act.

Accordingly, this Court should uphold EPA's actions in promulgating the effluent limitations guidelines regulations in issue as a proper exercise of the Administrator's authority.

Respectfully submitted,

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